

Emission-line stars discovered in the UKST $H\alpha$ survey of the Large Magellanic Cloud; Part 1: Hot stars

Warren A. Reid^{1,2*} and Quentin A. Parker^{1,2,3*†}

¹*Department of Physics, Macquarie University, Sydney, NSW 2109, Australia*

²*Macquarie University Research Centre in Astronomy, Astrophysics & Astrophotonics, Macquarie University, Sydney, NSW 2109, Australia*

³*Australian Astronomical Observatory, PO Box 296, Epping, NSW 1710 Australia*

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ABSTRACT

We present new, accurate positions, spectral classifications, radial and rotational velocities, $H\alpha$ fluxes, equivalent widths and B,V,I,R magnitudes for 579 hot emission-line stars (classes B0 - F9) in the Large Magellanic Cloud (LMC) which include 469 new discoveries. Candidate emission line stars were discovered using a deep, high resolution $H\alpha$ map of the central 25 deg² of the LMC obtained by median stacking a dozen 2 hour $H\alpha$ exposures taken with the UK Schmidt Telescope (UKST). Spectroscopic follow-up observations on the Anglo-Australian Telescope (AAT), the UKST, the Very Large Telescope (VLT), the South African Astronomical Observatory (SAAO) 1.9m and the 2.3m telescope at Siding Spring Observatory have established the identity of these faint sources down to magnitude $R_{\text{equiv}} \sim 23$ for $H\alpha$ (4.5×10^{-17} ergs cm⁻² s⁻¹ Å⁻¹).

Confirmed emission-line stars have been assigned an underlying spectral classification through cross-correlation against 131 absorption line template spectra covering the range O1 to F8. We confirm 111 previously identified emission line stars and 64 previously known variable stars with spectral types hotter than F8. The majority of hot stars identified (518 stars or 89%) are class B. Of all the hot emission-line stars in classes B-F, 130 or 22% are type B[e], characterised by the presence of forbidden emission lines such as [S II], [N II] and [O II]. We report on the physical location of these stars with reference to possible contamination from ambient H II emission. Only 13 of the emission-line stars require additional high resolution spectroscopic observations in order to assign a spectroscopic classification. They have nonetheless been added to the catalogue.

Along with flux calibration of the $H\alpha$ emission we provide the first $H\alpha$ luminosity function for selected sub-samples after correction for any possible nebula or ambient contamination. We find a moderate correlation between the intensity of $H\alpha$ emission and the V magnitude of the central star based on SuperCOSMOS magnitudes and the Optical Gravitational Lensing Experiment (OGLE-II) photometry where possible. Cool stars from classes G-S, with and without strong $H\alpha$ emission, will be the focus of part 2 in this series.

Key words: stars: emission-line, Be - stars: rotation - Magellanic Clouds - surveys - stars: kinematics and dynamics - line: profiles.

1 INTRODUCTION

The Large Magellanic Cloud (LMC) is a unique laboratory in which to study the peculiar characteristics of massive and luminous emission-line stars. At a known distance of ~ 50 kpc (see Reid & Parker 2010 and references therein) to all

LMC members, modest inclination angle to the line of sight (~ 21 deg) and with relatively low interstellar extinction ($R_V = 3.41 \pm 0.06$; Gordon et al. 2003), apparent brightness is a good indicator of absolute luminosity to within a few tenths of a magnitude.

We take advantage of these benefits as we identify and begin basic analysis of emission-line stars in the LMC. The most prominent observational feature of the emission-line stellar group is the presence of the $H\alpha$ line. The presence of

* E-mail: warren.reid@mq.edu.au; war@aa0.gov.au (WR);

† E-mail: quentin.parker@mq.edu.au (QAP)

this emission feature has been widely used as an identifier in the many previous searches for emission-line stars in the LMC (eg. Feast et al. 1960; Henize 1956; Lindsay 1963, 1974; Bohannon & Epps 1974; Grebel 1997; Keller et al. 1999; Grebel & Chu 2000; Keller et al. 2000; Olsen et al. 2001). None of these surveys went particularly deep. More recently, the OGLE II database has prevailed as the main tool used to uncover emission-line star candidates (Sabogal et al. 2005).

The UKST H α survey of the central 25deg² of the LMC has changed this situation. It was adjunct to the successful Southern Galactic Plane H α survey (Parker et al. 2005) and has revealed large numbers of various emission objects. In addition to revealing 460 new planetary nebulae within the survey region which were confirmed spectroscopically (Reid & Parker, 2006a,b), spectroscopic followup and careful analysis has revealed 579 hot emission-line stars with spectral classes B-F out of a total sample of 1,062 emission-line stars of all spectral types uncovered. Only 111 of these were previously known or identified while 469 are newly discovered. The majority are Be, B[e], Bpe and HAeBe stars but two are Luminous Blue Variable (LBV) candidates. Identifying these objects will assist our understanding of the main sequence evolution of massive stars. We have also identified 6 new and 33 previously known Wolf-Rayet stars, which are not included in this number but will be the special focus of a follow-up paper.

Be stars are known to be variables which undergo active and quiescent stages (Telting 2000; Bjorkman et al. 2002). A single epoch survey could miss many of these stars if they were undergoing a quiescent stage. This problem has already been demonstrated by several follow-up investigations (Hummel et al. 1999; Keller et al. 1999; Wisniewski and Bjorkman 2006) which were unable to identify all of the previously identified Be stars in the Magellanic Clouds and in the Galaxy. In addition, these same follow-up studies revealed previously unidentified Be stars. Our H α survey, utilising 12 H α exposures taken over a three year period has largely alleviated such problems and revealed a large number of emission-line stars in the survey region to a magnitude of $R_{\text{equiv}} \sim 22$ for H α .

In order to study the Balmer emission we have measured the Equivalent Width (EW) and Full Width Half Maximum (FWHM) of the H α emission-lines. In addition, we include H α fluxes from medium resolution spectroscopy of 575 (99.3%) of the detected emission-line stars within the survey area. Our follow-up spectroscopy was conducted from November 2004 to February 2005 on a variety of telescopes, allowing us to re-observe several known variable stars and detect minor changes in spectral characteristics. All but 2 candidate emission-line stars found in the H α survey had some degree of H α emission detectable in their spectrum at the time of observation. After describing flux calibration (section 5), we explain the method used to assign a spectral classification and luminosity class to each star using cross-correlation against well-established templates (section 6). Section 7 describes our method for deriving the rotational velocities and section 8 outlines a simple method for correcting or at least estimating nebula contribution in the spectrum. Section 9 details our routine for assigning accurate positions to each star.

In section 10 we describe the method used for measuring the radial velocity of each star. Velocities accurate to ~ 4 km

s⁻¹ have been found for 572 emission-line stars using both the weighted emission-line and cross-correlation techniques on our higher dispersion spectroscopic data. These velocities can be used to search for kinematical substructures in the LMC disk, create a 3D kinematic map of the LMC for comparison with the H I disk, assist studies of age-metallicity dispersion and distribution, potentially find stellar associations and streams, and compare medium to old age populations such as planetary nebulae within the LMC (Reid & Parker 2006b).

In section 11 we show the projected distribution of emission-line stars and late-type stars across the survey field of the LMC. In section 12 we measure the intensity of the H α emission considering ambient sky and any nebula contamination in order to create the first luminosity function for these stars in the LMC. Then, in section 13 we assess the emission by comparing BVI photometry from SuperCOSMOS and OGLE-II data where available. We discuss the stellar photometry, its reliability and problems associated with variability. In section 14 we briefly discuss the variability already found in many of the candidate emission-line stars. The full catalogue of emission-line stars is described in section 15 and presented in the appendix. Individual spectra and H α images will be available (2nd half 2012) on a dedicated web page hosted by the Astronomy Department at Macquarie University.

2 BACKGROUND TO HOT EMISSION-LINE STARS

The origin of emission-lines in hot stars such as Be stars is not well understood. Such emission-line stars are found near the main sequence of luminosity classes V to III exhibiting Balmer emission (Jaschek et al. 1981, Frew & Parker 2010). Various mechanisms have been proposed to explain how gaseous circumstellar disks may form around Be stars (see Porter & Rivinius, 2003 for a review). Struve (1931) was the first to speculate that Be stars exhibit rapid rotation. Recent theoretical studies suggest that classical Be stars may be rotating close to their critical velocity (Townsend et al. 2004) and exhibiting a strange form of variability (Kaler 1997). Other models of circumstellar disk formation include the wind-compressed model (Bjorkman & Cassinelli 1993), pulsations arising from the stellar photosphere (Rivinius et al. 2001) and the magnetically torqued and wind compressed disk model (Cassinelli et al. 2002). While variables such as Cepheids and Miras are known to pulsate radially, many stars also pulsate non-radially, producing subtle magnitude variations and changing the shape of absorption lines. It has been suggested that these oscillations, common on the O and B main sequence, may be powerful enough to drive the winds which produce the Be phenomenon (Kaler 1997).

In the case of pre main sequence (PMS) T Tauri stars, the origin of the emission lines is understood in terms of the magnetospheric accretion model, where the emission lines originate from magnetospheric accretion columns (Uchida & Shibata 1985; Königl 1991; Hartmann et al. 1994; Muzerolle et al. 1998, 2001). With the detection of magnetic fields in a few Herbig AeBe stars (Hubrig et al. 2004; Wade et al. 2005), the magnetospheric accretion model was successfully

applied to these objects (Muzerolle et al. 2004). However, the mechanism for triggering the accretion is still not known.

B[e] stars have all the characteristics of Be stars but they additionally include forbidden emission lines in their spectra. Although lines such as [O III] $\lambda 5007$ are suggestive of planetary nebulae (PNe), the presence of Fe emission and He absorption in the strong blue continuum clearly separate B[e] stars from PNe.

The evolutionary sequence of these stars is still not well known. Nor is the non-spherically symmetric circumstellar environment which is responsible for the B[e] phenomenon. Strong variability often reported from these objects has been explained by outbursts and shell phases (Hutsemekers 1985; Andrillat & Houziaux 1991).

Related stars such as Herbig Ae/Be (HAeBe) stars, first discussed by Herbig (1960) are found above the main sequence on the HR diagram and are believed to be making their way toward it along radiative tracks as first postulated by Henyey et al (1955). Along with T Tauri stars, they share the characteristic of being associated with a nebula and infra-red emission indicating the presence of circumstellar dust (Hillenbrand et al. 1992; Lada & Adams, 1992). What immediately separates them from T Tauri stars is their larger mass of between $2M_{\odot}$ and $10M_{\odot}$. In order to separate HAeBe stars from B[e] supergiants, Waters and Waelkens (1998) included the condition that HAeBe stars should be of luminosity classes V to III.

As well as the Balmer lines, other optical emission-lines often observed in HAeBe emission-line stars include He I ($\lambda 5876\text{\AA}$ and $\lambda 6678\text{\AA}$), O I ($\lambda 7774\text{\AA}$ and $\lambda 8446\text{\AA}$) and the Ca II triplet ($\lambda 8498\text{\AA}$, $\lambda 8542\text{\AA}$ and $\lambda 8662\text{\AA}$) (Herbig 1960; Hamann 1994; Böhm & Catala 1994; Böhm & Hirth 1997; Corcoran & Ray 1998; Viera et al. 2003; Acke et al. 2005). We do not attempt to separate HAeBe stars from B[e] stars since many HAeBe and B[e] stars are spectroscopically indistinguishable.

3 OPTICAL OBSERVATIONS

3.1 The H α survey

Over a period of three years, from 1997, a series of repeated narrow-band H α and matching broad-band short red (SR) exposures of the central LMC field were taken in order to produce a deep H α and SR image with a 1 magnitude depth gain over a single image frame. The twelve highest quality and well-matched UK Schmidt Telescope 2-hour H α exposures and six 15-minute equivalent SR-band exposures were selected. From these exposures, deep, homogeneous, narrow-band H α and matching broad-band SR maps of the entire central 25 deg^2 region of the LMC were constructed.

The full aperture H α filter used for this survey was effectively the world's largest monolithic interference filter to be used in astronomy (Parker & Bland-Hawthorn 1998). The choice of central wavelength ($\lambda 6590\text{\AA}$) and bandpass (70 \AA FWHM) work effectively in the UKST's fast f/2.48 converging beam meaning the H α line remains within the filter band-pass for velocities up to 400 km s^{-1} . Peak filter transmission is $>85\%$. The fields for the survey were exposed on non-standard, overlapping 4-degree centres due to the circular aperture of the H α filter. These overlapped fields enabled

full contiguous coverage of the entire LMC/SMC region in H α despite the circular aperture.

The successful implementation of high resolution, panchromatic Tech-Pan film on the UKST, coupled with its peak sensitivity at H α , was a prime motivation for the survey. Tech-pan film was an ideal wide-field photographic detector for use with an H α filter. The resulting images produced were unequalled in terms of their combined resolution, sensitivity and LMC coverage. Further details of the properties of Tech-Pan can be found in Parker & Malin (1999).

The SuperCOSMOS plate-measuring machine at the Royal Observatory Edinburgh (Hambly et al. 2001) was used to scan, co-add and pixel match these selected exposures creating $10\mu\text{m}$ (0.67 arcsec) pixel data which extends 1.35 (H α) and 1 (SR) magnitude deeper than individual exposures, achieving the full canonical Poissonian depth gain, e.g. Bland-Hawthorn, Shopbell & Malin (1993). This gives a depth ~ 21.5 for the SR images and $R_{\text{equiv}} \sim 22$ for H α ($4.5 \times 10^{-17}\text{ ergs cm}^{-2}\text{ s}^{-1}\text{ \AA}^{-1}$) which is at least 1 magnitude deeper than the best wide-field narrow-band LMC images previously available. An accurate world co-ordinate system was applied to yield sub-arcsec astrometry (see section 9), essential for success of the spectroscopic follow-up observations.

3.2 Emission-line star discovery technique and criteria

The deep UKST H α survey of the LMC was originally undertaken in order to uncover multiple compact emission sources. Our successful search for extremely faint PNe (Reid & Parker 2006a,b) is proof of its worth. It soon became clear, however, that the depth and resolution of the maps allowed us to also search for low luminosity stellar sources which exhibit detectable emission-lines. Since our aim was to uncover faint sources, we largely ignored extremely bright stars, whether or not they exhibited H α emission. Many of the better known, bright emission-line stars in the LMC will therefore not appear in this work. What we have included in our survey is a large sample of emission-line star candidates that comply with the expected luminosity of brightest to faintest LMC PNe (M_B 13 - 24).

Candidate emission-line stars were found using an adaptation of a technique available within KARMA, first reported in Reid & Parker (2005). The SR images were assigned a false red colour and merged with the H α narrow-band images assigned a blue colour. Careful selection of software parameters allowed the intensity of the matched H α and SR .fits images to be perfectly balanced allowing only peculiarities of one or other pass-band to be observed and measured. Using this technique, normal continuum stars appear uniformly pinkish in colour. Emission objects such as H II regions and PNe are strongly coloured blue. The broader point spread function (PSF) of the H α line in emission-line stars creates a faint blue aura around the star, allowing them to be easily detected. Figures 1 to 5 show a small 30×30 arcsec area of the stacked SR and H α maps featuring Be stars, RPs255, RPs256, RPs285, RPs286 and RPs338¹ respectively

¹ RPs refers to Reid Parker star

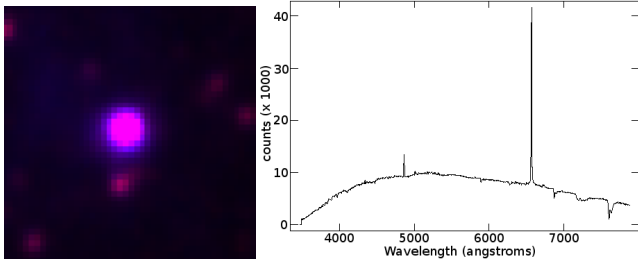


Figure 1. $H\alpha/R$ 30 \times 30 arcsec image and 2dF low resolution spectrum of RPs255 also known as BE474 (Bohannon & Epps, 1974) and as L333 (Lindsay, 1963). $M_{H\alpha}=16.37$. Compact $H\alpha$ emission 9.6 arcsec dia is largely due to PSF. North is upwards.

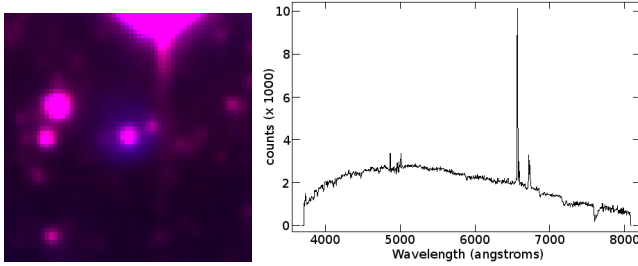


Figure 2. Same as above for newly discovered emission-line star RPs256. $M_{H\alpha}=19.34$. Forbidden lines lead to B[e] classification.

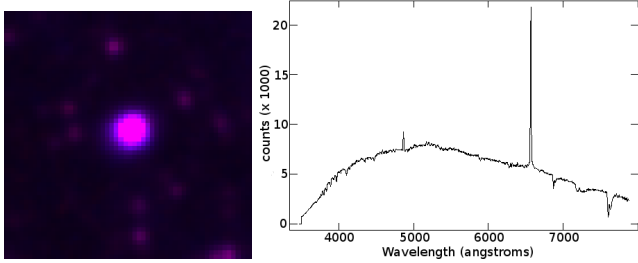


Figure 3. Same as above for RPs285 also known as BE411 (Bohannon & Epps, 1974). $M_{H\alpha}=16.92$.

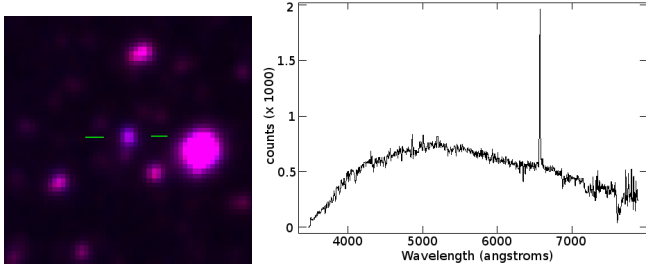


Figure 4. Same as above for RPs286 also known as BE426 (Bohannon & Epps, 1974). $M_{H\alpha}=19.37$. Only 2.4 arcsec dia on the image including minor PSF contribution.

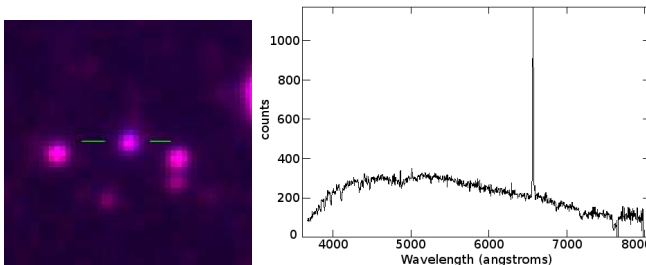


Figure 5. Same as above for newly discovered emission-line star RPs338. $M_{H\alpha}=20.19$. Only 2.8 arcsec dia. on image.

at the centre together with their confirmatory 2dF spectrum. Spectroscopic confirmation shows us that the wider and more diffuse halo seen surrounding examples such as RPs256 (Figure 2) strongly indicates the presence of forbidden lines in the spectrum, leading to its classification as a B[e] star.

Even with a narrow band $H\alpha$ filter, the presence of faint Balmer lines in LMC emission-line stars can be very difficult to detect. Although it can be quite easy to miss such faint sources, the colouring and merging of the maps makes detection straightforward, preventing objects above a certain EW threshold from being overlooked and allowing the full depth gain of the maps to be utilized.

4 SPECTROSCOPIC CONFIRMATION OF CANDIDATE EMISSION-LINE STARS

Having used the stacked $H\alpha$ and SR maps to catalogue over 2,000 emission sources, a large follow-up spectroscopic programme was undertaken in order to identify and classify each source. The most effective and efficient way to follow-up such a large number of objects was to use wide-field multi-object spectroscopic (MOS) systems such as 2dF on the Anglo-Australian Telescope (AAT), 6dF on the UK Schmidt Telescope (UKST) and FLAMES on the Very Large Telescope (VLT). Bright, extended emission objects were selected to be observed individually using long-slit spectroscopic systems on the South African Astronomical Observatory (SAAO) 1.9m telescope and the Mount Stromlo and Siding Spring Observatory (MSSSO) 2.3m telescope.

In Table 1 we summarise details regarding the spectroscopic follow-up observations. The field names are observation identifications or object names in the case of the 2.3m observations. Each of these multi-fibre observations have different central coordinates. The first three 2dF fields, with prefix ST., are service time runs. Classical observations using 2dF on the AAT provided 15 pointings of 1 degree radius labeled A to O. FLAMES observations on the VLT provided 9 field pointings with an 11 arcminute radius. The FLAMES observations were centred on several of the densest areas on the LMC main bar. The three fields observed with 6dF on the UKST were repeated, subsequently with a different set of stars and extended objects, maximising use of the wide 6 arcsec fibres.

4.1 2dF observations

A five night observing run on the AAT using 2dF (Lewis et al. 2002) was undertaken in December 2004 to spectroscopically confirm LMC emission candidates. The identification of peculiarities associated with $H\alpha$ excess in various object types (see Reid & Parker 2006a for more details) indicated that we could expect our candidates to be a mixture of PNe, compact H II regions, and emission-line stars such as Be, Ae, WRs, T Tauri, M giants, carbon stars and a number of symbiotics. 2dF was an ideal choice of instrument for the spectroscopic follow-up of large numbers of candidate emission objects due to its unique ability to simultaneously observe 400 targets (including objects, fiducial stars and sky positions) with 2 arcsec fibres over a wide 2 degree diameter

Table 1. Observing logs for LMC Emission-line object follow-up. In some instances the same object has been observed multiple times at different resolutions and in overlapping fields.

Field Name	Telesc.	Date	Grating Dispenser	Dispersion Å/pixel	Central λ (Å)	Coverage λ (Å)	T _{exp} s	N _{exp}	N _{obj}
2dF-ST1	AAT	26 Nov-03	300B	4.299	5841	3650 - 7960	1500	2	131
2dF-ST2	AAT	26 Nov-03	300B	4.299	5841	3650 - 7960	1500	2	80
2dF-ST3	AAT	15 March-03	300B	4.299	5852	3660 - 7970	1800	2	81
a1550,061-213	1.9m	09-13 Nov-04	300	5	5800	3850 - 7738	800	2	11
a1550,214-324	1.9m	11-15 Nov-04	1200	1	6563	6000 - 7120	1000	2	10
FLAMES 1-9	VLT	5-7 Dec-04	LR2	0.339	4272	3960 - 4567	1000	3	420
FLAMES 1-9	VLT	5-7 Dec-04	LR3	0.339	4797	4500 - 5077	1000	3	420
FLAMES 1-9	VLT	5-7 Dec-04	LR6	0.339	6822	6438 - 7172	1000	3	420
2dF A-O	AAT	13-16 Dec-04	300B	4.3	5852	3660 - 7970	1200	3	3603
2dF-1200R A-O	AAT	17-18 Dec-04	1200R	1.105	6793	6220 - 7340	1200	2	3303
RP's	2.3m	07-18 Jan-05	600R+B	2.2	4600	3600 - 5570	900	2	56
RP's	2.3m	07-18 Jan-05	600R+B	2.2	6563	5515 - 7520	900	2	56
6dF 1-3	UKST	3-5 Feb-05	425R	0.62	6750	5318 - 7576	600	3	573
6dF 1-3	UKST	3-5 Feb-05	580V	0.62	4750	3948 - 5600	600	3	573

field area. The large corrector lens incorporates an atmospheric dispersion compensator, which is essential for wide wavelength coverage using small diameter fibres.

The observations provided $\sim 4,000$ spectra. Individual exposure times were mostly 1200s using the 300B grating with a central wavelength of $\lambda 5852\text{\AA}$ and wavelength range $\lambda 3600\text{--}8000\text{\AA}$ at a dispersion of $4.30\text{\AA}/\text{pixel}$. These low-resolution observations, at 9.0\AA FWHM, were the primary means of object identification and were used in cross-correlation to provide spectral classifications. All fields were then re-observed using the higher resolution 1200R grating to gain our radial velocities with wavelength range $\lambda 6220\text{--}7340\text{\AA}$.

4.2 ESO VLT FLAMES observations

Our data includes additional spectroscopic observations in dense regions of the LMC main bar, undertaken using the multi-object fibre spectroscopic system, FLAMES (Pasquini 2002) on the VLT UT2 over three nights in December 2004. The OzPoz positioner on FLAMES was used to position the 130 available fibres with an accuracy of better than 0.1 arcsec. Gratings LR2 and LR3 allowed us to cover the most important optical diagnostic lines for emission-line stars in the blue including [O III] $\lambda 4363$, He II $\lambda 4686$, H β and [O III] $\lambda 4959$ & $\lambda 5007$ in emission and absorption lines such as He I $\lambda 4471$, $\lambda 4387$, $\lambda 4144$, $\lambda 4121$, $\lambda 4026$, $\lambda 4009$ and $\lambda 3820$. Grating LR6 covered the H α , [N II] $\lambda 6548$ and $\lambda 6583$ lines as well as the [S II] $\lambda 6716$ & $\lambda 6731$ lines. Using these low resolution gratings allowed us to both identify and classify objects and observe micro-structures such as self-absorption within the Balmer emission lines. The observed FLAMES 25 arcmin diameter fields, containing a total of 420 objects, overlapped with 2dF fields, providing a continuous coverage of the main bar region.

4.3 6dF observations

A 3 night observing run was also undertaken on the 3-5th February 2005 using the 6dF 150 fibre MOS system on the

UKST. Each of these observations covered an impressive 6 degree diameter field on the sky and allowed us to observe candidates that were missed in 2dF observations due to crowding. The separate 580V and 425R gratings provided continuous coverage across the optical range from $\lambda 3700\text{\AA}$ to $\lambda 7550\text{\AA}$ for 573 objects observed. A proportion close to 50% were re-observations of objects previously covered using 2dF, providing additional object confirmation. The wider 6 arcsec fibres on 6dF, compared to the 2 arcsec fibres on 2dF, meant that we had to re-examine the location of each object in order to avoid observing close stellar sources with that instrument. On the other hand, the 6 arcsec fibre meant that it was an excellent choice of instrument for extended sources such as large PNe with post AGB halos and compact H II regions.

4.4 Long-slit observations

Long-slit spectra were obtained using the 1.9m telescope at the South African Astronomical Observatory in November 2004 and 2.3m telescope at Mount Stromlo and Siding Spring Observatory (MSSSO) in January 2005. Both of these observing runs not only provided spectra for object confirmation and classification but assisted our flux calibration for fibre-based observations. Individually, the 1.9m telescope provided both low dispersion spectra for object identification and higher resolution spectra for radial velocities. Light fed to the double-beam spectrograph on the MSSSO 2.3m telescope was split by a dichroic and sent to red and blue optimised detectors. The resulting medium resolution red and blue spectra also provided spectroscopic confirmation of individual objects that were missed during multispec-observations due to overcrowding on field plates.

4.5 Reduction of spectra

The 2dF data were reduced using the sophisticated 2dFDR reduction software provided by the Australian Astronomical Observatory (AAO) specifically for the reduction of 2dF

multi-fibre spectra. The software performed the standard reduction procedures of bias and dark subtraction, flat fielding, sky subtraction, tram-line mapping to the fibre locations on the CCD, fibre extraction, arc line identification, wavelength calibration and fibre throughput calibration as well as providing a user interface with several options, specific to 2dF multi-fibre reductions. Specific bias frames are not required as the software simply makes use of the under-scan/overscan bias strips on each CCD exposure.

The FIT method of fibre extraction was used as it simultaneously fits Gaussians to the spectrum being extracted and to the two either side of it, allowing the amount of overlap at each point along the spectrum to be evaluated. This method also minimises contamination between fibres and was applied to all the reductions.

To perform the sky subtraction, the data was first corrected for the relative fibre throughput, based on a throughput map derived from about 15 dedicated sky fibres which were carefully selected across the 2dF field to avoid stars and ambient emission. The relative intensities of the skylines in the object data frame were used to determine the relative fibre throughput. This method saves time, as no off-set sky observations were required.

Cosmic rays were rejected either automatically during the process of combining two or more observations on the same field setup. This method was used because under certain circumstances the spatial profile is sometimes sensitive to the spectral structure of the data and it can mistake a strong emission-line for a cosmic ray.

Raw data from 6dF on the UKST was reduced using a tailored 6dF variant of the same (2dFDR) data reduction software. A specific input file informs the software that 6dF data is to be reduced. Like 2dF, a separate file relating to the specific grating must be used. Again, cosmic rays were rejected automatically during the process of combining two or more observations of the same field.

VLT FLAMES data were reduced using the pipeline system provided by ESO through the ‘GASGANO’ Java-based data file organiser developed and maintained by ESO. This graphic interface identifies the input file types, produces a master bias, flat, and dark frame, then reduces and combines the science frames.

The 2.3m and 1.9m telescope spectra were reduced using the standard long-slit IRAF tasks IMRED, SPECRED and CCDRED and FIGARO’s task BCLEAN. Cosmic rays were rejected when combining frames. One-dimensional spectra were created and the background sky was subtracted. Final flux calibration used the standard stars LTT7987, LTT9239, LTT2415 and LTT9491.

5 FLUX CALIBRATION OF THE 2DF FIBRE SPECTRA

The large proportion of objects observed with 2dF means that a reliable flux calibration of the LMC stellar emission-lines was required in order to compare stellar spectra from different 2dF fields, to make meaningful comparisons between fibre spectroscopy and long-slit observations of individual objects, and to create a luminosity function.

Altogether, 18 overlapping 2dF fields, 9 FLAMES fields and 6 6dF multi-object fields were observed in order to cover

the entire central 25deg² survey region of the LMC. To calibrate the resulting data counts, we used PNe with low continuum levels and well determined fluxes gained from HST observations (see Reid & Parker 2006a, 2006b). These objects were deliberately included and observed on each field plate for use as flux calibrators for each individual field.

The process involved matching each spectral line on each field plate from each CCD camera to raw PN fluxes gained from HST exposures. The individual H β and H α 2dF line intensities for known PNe observed on each CCD and each field plate exposure were plotted against HST-gained published fluxes for the same lines (see Figure 2 in Reid & Parker, 2010).

The agreement of flux-calibrated PNe from each spectrograph/field plate combination was considered robust enough (within 0.2 dex) to allow calibration to all the H β and H α emission-lines for other emission objects observed in the same field. In each case, a line of best fit was derived and the underlying linear equation extracted. This equation became the calibrator for each emission-line in each object where the CCD and individual 2dF field plate exposure was the same. Full details including a discussion on the reliability of the method are presented in Reid & Parker (2010).

6 SPECTRAL CLASSIFICATION

Spectral classification of all the emission-line stars was undertaken to assist in various studies such as the distribution of emission by stellar population, the estimation of central star temperatures, creation of H-R diagrams and improving our understanding of Balmer emission in stars of varying temperatures. We touch on some of these issues later in this paper.

6.1 Method of classification

To assign a spectral classification, it is necessary to measure the strengths and widths of various absorption features which depict specific stellar temperatures and surface gravities, independent of any associated emission characteristics. To assist this process we used standard stellar spectra supplemented by 10 LMC emission-line stars from our sample with recognised spectral classifications as templates. The spectral standards were based on observations available from Jacoby et al (1984), Turnshek et al (1985), Silva and Cornell (1992), Pickles (1998) and Le Borgne et al. (2003).

The classification of emission-line stars is complex and often problematic due to their variability and atmospheric activity. The strength and profile of the Balmer lines in emission only lend moderate assistance to classification, although the equivalent width of H γ can be a good indicator of spectral type and luminosity in main sequence stars (Underhill & Doazan 1982). In the spectra of young stars such as T Tauri stars, photospheric absorption lines can be filled in or disguised by UV radiation from accretion hotspots (Hartigan et al. 1995; Gullbring et al. 1998), making classification difficult. Further complication arises from active Post Main Sequence (PMS) stars where most spectral lines are in emission (Cohen & Kuhl, 1979; Hernández et al., 2004). These

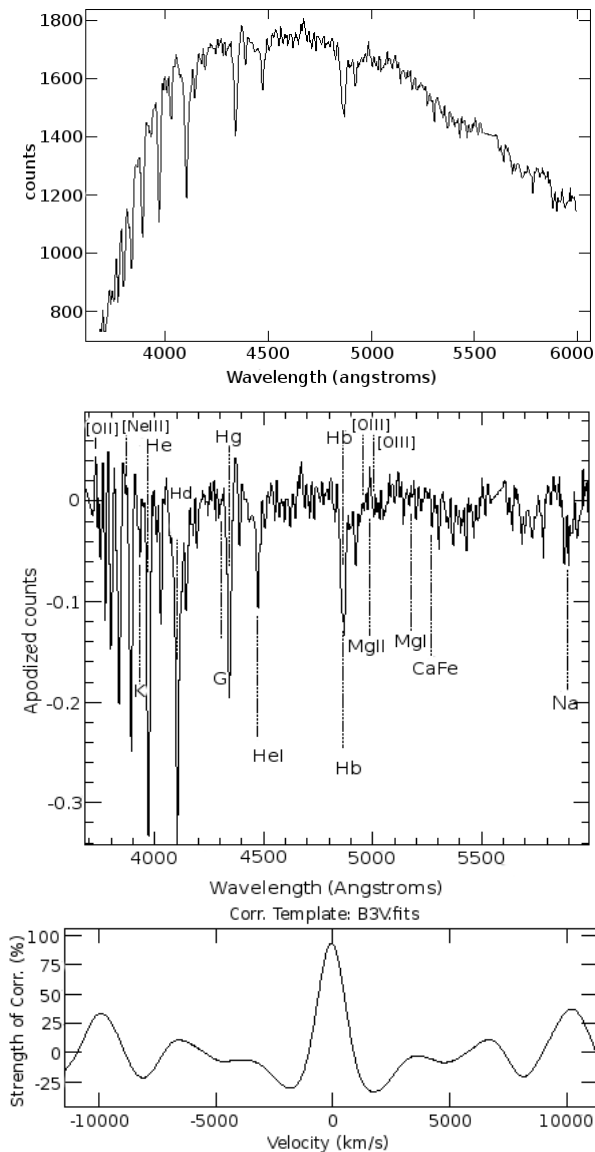


Figure 6. The top image shows the blue end of the RPs1326 optical spectrum prior to the removal of emission-lines and continuum. The centre frame shows the apodized and continuum subtracted spectrum, created within XCSAO and used in cross-correlation to match the best fitting template. The lower frame shows the strength of the resulting correlation, represented by the central gaussian curve, once the task has found the best-fitting template.

types are usually denoted as ‘continuum stars’ since it is virtually impossible to accurately assign a spectral type.

Due to the large number of emission-lines stars to be classified in this survey, as a first step, a cross-correlation routine was employed. Although the IRAF XCSAO task was originally developed in order to cross correlate galactic spectra against templates and gain redshifts (Tonry and Davis, 1979), it works equally as well as a spectral classification tool with stellar templates. The task identifies the closest spectrum in terms of line strengths and widths found and then returns a velocity along with the name of the best matching

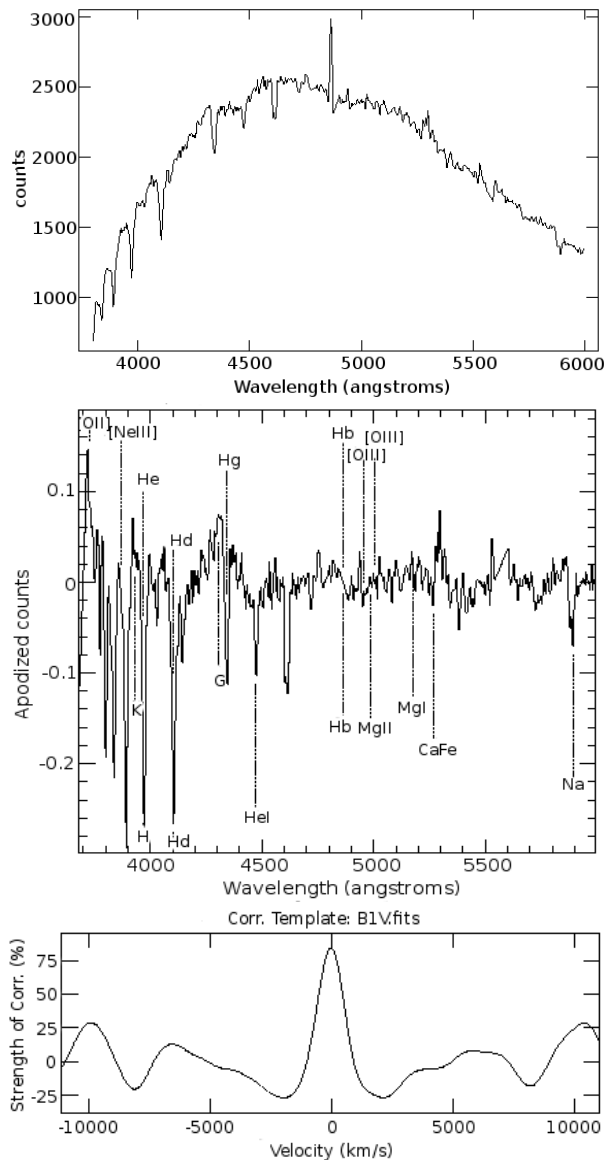


Figure 7. The same as Figure 6 but showing the blue end of the RPs1262, a B1V optical spectrum with top: the original blue end including emission-lines and continuum prior to their removal, middle: the continuum-subtracted and apodised spectrum with detected lines identified automatically by the software, bottom: the correlation.

template through cross-correlation based on fourier transformations.

In order to produce the most accurate result, emission-lines (mainly the Balmer series and any residual telluric sky lines which can effect the cross-correlation) were removed. The continuum was then removed using the IRAF CONTINUUM task in order to cross-correlate the absorption lines alone. This negated the influence of the continuum where it was either stronger or weaker than the best matching spectrum in the templates, which were also continuum subtracted. Apodization within XCSAO uses a cosine bell to attenuate data on the ends of the spectrum, reducing high wave number fourier components that would be produced by abrupt cutoffs at the ends of the spectra, effectively smooth-

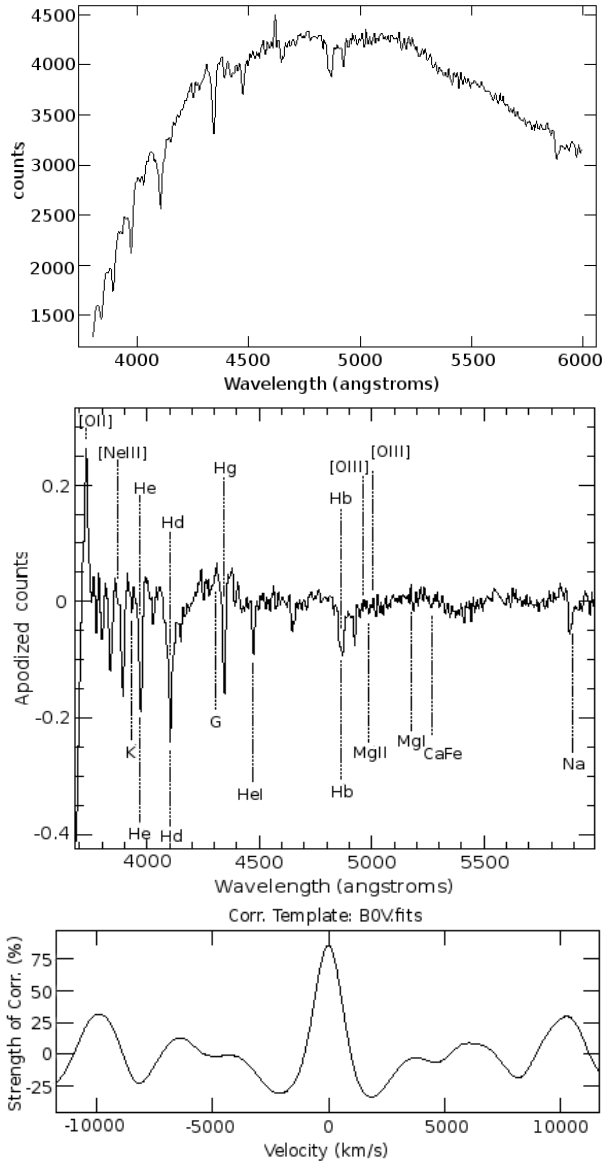


Figure 8. The same as Figure 6 but showing the blue end of RPs1367, a B0V optical spectrum with top: the original blue end including emission-lines and continuum prior to their removal, middle: the continuum-subtracted and apodized spectrum, bottom: the correlation.

ing out the continuum across the full length of the spectrum. Examples are shown in figures 6, 7 and 8 using only the blue end of the optical spectrum which contains the main diagnostic lines for spectral classification. The same is not true for late-type G to SC stars. For these stars, removal of emission-lines is still necessary but the overall shape of the spectrum becomes increasingly important with decreasing spectral type. By late K types it was already necessary to match the continuum with the templates using the wider optical spectrum ($\lambda 3700$ to $\lambda 8000$).

Having run the above-mentioned tasks, the raw spectra, including the emission lines, were then inspected and measured. B-type stars are strongly characterised by He and Balmer emission-lines. HeI lines show a very broad intensity maximum by B2 and B3. The intensity of Balmer lines

remains almost constant for Supergiant stars from B0 Ia through to A0 Ia but strengthens in late B giants. For main sequence stars, however, the Balmer lines strengthen from B0V to A0V. A more precise spectral type can therefore be confirmed by defining the ionisation temperature of Si and He supplemented by C II and C III. The main luminosity criteria are summarised in Table 2. In early B and late A main sequence through to F stars, line ratios are much easier to use for identification due to the larger number of lines available. The luminosity class can be tested by assessing the wings of the Balmer lines, which widen from classes I to V.

By applying these criteria, we re-classified 40 Be stars which were automatically classified as luminosity class I supergiants in the cross-correlation routine. Most of these were re-identified as giants or subgiants. Fast rotation of the Be stars causes the Balmer lines to broaden thereby matching spectra to supergiant stellar templates. This effect was countered by examining each spectrum with reference to the ratios as shown in Table 2.

6.2 Results of spectral classification

Although this paper is presenting the hot emission-line stars, it is important to note that the UKST $H\alpha$ survey also uncovered a large number of cooler G to SC stars which either emit strongly or are bright at $H\alpha$. These late stellar objects, which will be the subject of a second paper of this series, are listed briefly here in order to compare detection rates.

The majority of emission stars found have been classed as Be, [Be] (V - III) stars and M (III) giant stars. The letter ‘e’ indicates that, at the very least, the first member of the Balmer series ($H\alpha$) is in emission. Although we identified 13 supergiant B stars with $H\alpha$ emission, these types are not generally known as Be stars, a classification reserved for luminosity classes V, IV and III. Table 3 provides a quick breakdown of the various emission-line stars found in the central 25deg^2 LMC survey. Of these stars, 64 Be stars are previously known variable stars.

Figure 9 shows the spectral classification of the identified B to K emission-line stars in our survey. The number of stars found is subdivided by luminosity class according to the Morgan-Keenan system (Morgan et al. 1943) where the width of absorption lines are a measure of the size of the star and thus the total luminosity. As per the standard convention, class I are supergiants, class III are giants and class V are main sequence stars. It is clear that the largest number of emission-line stars found belong to class B and, of those, the supergiants are mainly found at B0. These supermassive stars again dominate our detections from classes G5 to K5. The largest spectral class of Be stars represented in our sample are those on the main sequence.

6.3 Types of emission-line stars found

Of the 468 newly discovered emission-line stars, we identified 107 B[e] stars that exhibit forbidden emission-lines. They were found in spectral types B0-B9. The most common forbidden emission-lines found in the B[e] stars were [Fe II] $\lambda 4244, 4287, 4415, 5273, 7155$, [O I] $\lambda 6300, 6363$, [N II] $\lambda 5755, 6548, 6584$, [S II] $\lambda 4068, 6717, 6730$, [O II] $\lambda 7320, 7330$, and [O III] $\lambda 4959, 5007$, the most frequent being

Table 2. The most important lines examined to assist in follow-up spectral classification after cross-correlation. These include the ratios and equivalent widths of the Balmer lines and the ratios of classification lines in the $\lambda 3500$ -4800 region of B-type stars. It should be noted that the ratios shown in columns 2-5 more or less depend on the luminosity. For example, He I is only weakly visible in A0 supergiants.

Class	Ratios & EW	Ratios	Ratios (later types)	Ratios (latest types)
Supergiants				
B0 Ia-B2 Ia	$H\alpha/H\beta/H\gamma$	He II 4542/He I 4471 He II 4200/He I 4144	Si III 4552/Si IV 4089	C III 4068/[O II] 4076 C II 4267/He I 4121
B2 Ia-B5 Ia	$H\alpha/H\beta/H\gamma$	Si III 4552/Si IV 4089	C III 4068/[O II] 4076	C II 4267/He I 4121
B5 Ia-A0 Ia	$H\alpha/H\beta$	Si II 4128,31/He I 4121	Si II 4128,31/He I 4026	Si II 3856, 63/He I 3820, 4026
Giants				
O5 III-B0 III	$H\alpha/H\beta/H\gamma$	He II 4200, 4542/He I 4471	Si IV 4089/H δ	He I 4388/H γ
B0 III-B5 III	$H\alpha/H\beta/H\gamma$	Si IV 4089/Si III 4553	C III 4647-51/He I 4388	Mg II 4481/He I 4471
B5 III-A0 III	$H\alpha/H\beta$	Mg III 4481/He I 4471	Si II 4128,31/He I 4144,4026	
Main Sequence				
O4 V-B0 V	$H\alpha/H\beta/H\gamma$	He II 4542/He I 4471	He II 4686/He I 4922	Si IV 4089/He I 4144
B0 V-B5 V	$H\alpha/H\beta/H\gamma$	Si IV 4089,4116/He I 4121	He II 4686/He I 4713	C III 4068-70/He I 4009 C III 4647-51/He I 4713
B5 V - A0 V	$H\alpha/H\beta$	Si II 4128,31/He I 4144,4026	Mg II 4481/He I 4471*	C II 4267/Mg II 4481

* The He I $\lambda 4471$ line is all but gone in main sequence stars by B8 V.

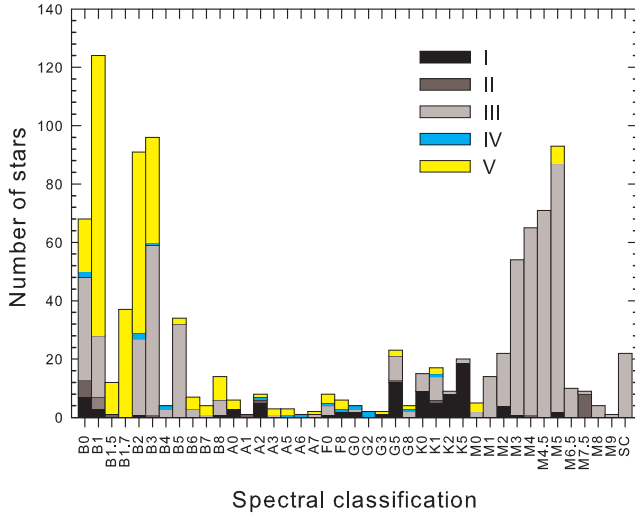


Figure 9. Distribution of all types of emission-line stars found within our survey region of the LMC according to number and spectral classification. The number of stars in each class is subdivided in order to express the luminosity class of the star according to the Morgan-Keenan system. It is clear that there are more main sequence stars, bright in $H\alpha$ emission, within the B spectral class. Class SC may be divided into $4 \times SC4/9$ stars, $1 \times S4/2$, $1 \times S4/6$ and 16 carbon stars, 13 of which are C6.

[Fe II] and [O I]. The ionisation potentials of the last two, less than 25eV, place them lower than the ion energies found in planetary nebulae.

We have also identified early B-type stars with anomalies (weak or strong) in carbon, nitrogen and usually oxygen. These were first labelled CNO stars by Jaschek & Jaschek (1967). The stars with anomalies in their heavier elements are called Bp stars, where ‘p’ designates ‘peculiar’. We have identified 5 Bp candidates. They are particularly enhanced in Si- $\lambda 4200$, Mn II, Cr II, Eu II and Sr II.

As the cores of intermediate mass stars ($M_* = 1-8M_\odot$)

Table 3. Classification of stellar emission sources for the whole catalogue. The numbers provided in column 4 are not additional but represent the number of stars previously known as variable.

Object Type	Previously known	Newly discovered	known variable
O stars		1	
Be stars	82	306	55
B[e] stars	23	107	9
Ae stars	3	29	
F stars	3	25	
G stars		29	
K stars		49	
M stars	86	315	33
WR stars	33	6	
Carbon stars		16	
CVs	4		4
Eclipsing Binaries	3		3
LBVs		2	
Bp stars	2	5	
AGB stars	4		
Symbiotic stars		18	
hot stars without id.		14	
cool stars without id.		7	

become too depleted in hydrogen for fusion reactions, they leave the main sequence to ascend the Red Giant Branch (RGB) and Asymptotic Giant Branch (AGB). At this point, the stars are seen as Miras or OH/IR stars with maser activity (Winckel, 2003). Although these stars will become the central stars of planetary nebulae, they are not yet hot enough to ionise a potential vast halo of expelled material. Nevertheless, the dense, complex atmospheric matter, including possible extended circumstellar envelopes, is ionised sufficiently to be detected in $H\alpha$ and [N II].

The second largest group of stars uncovered in this survey are the M giants. Due to their cooler temperature, these stars have an spectral energy distribution (SED) that peaks towards the red end of the spectrum. They often exhibit strong excess $H\alpha$ emission originating from the chromo-

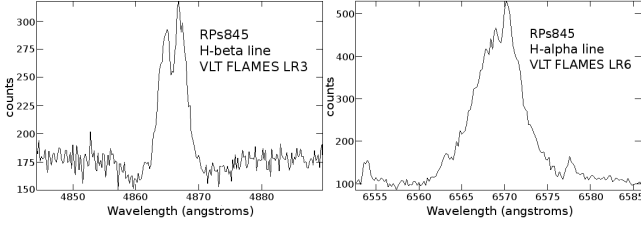


Figure 10. An example of Balmer line splitting where we can see fine structure components. These profiles often feature three or more emission peaks and minute detailed features extending down to the continuum. The example shown is RPs845 with H β left (FLAMES LR3 grating) and H α right (FLAMES LR6 grating). The absorption wings of the H β line are also greatly broadened by the Stark effect indicating that these are main sequence stars where the gravity and electron pressure is large.

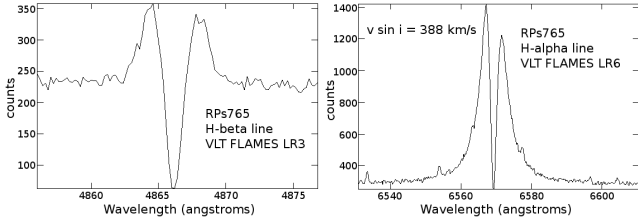


Figure 11. An example of Balmer line splitting, typical of a ‘shell star’ or more correctly, a star going through a shell phase, where the central absorption on the H α line extends below the stellar continuum. The example shown is RPs765 with H β left (FLAMES LR3 grating) and H α right (FLAMES LR6 grating).

sphere which strengthens with increasing spectral type or decreasing luminosity. For this reason the H α line cannot be used as a classification criteria and was removed prior to cross-correlation.

Late-type M giants feature TiO and VO bands which strengthen with decreasing temperature. They also feature Mg λ 5167,5173,5184 until M4III and M6.5V as well as NaI λ 5890,5896 although the latter can be overwhelmed by TiO absorption in stars later than M2III.

Our survey uncovered 401 M giant stars with emission, 315 of which are newly identified. Of the 86 previously known M giants, 33 have been found to have variable luminosity. These M giants, together with a number of G and K emission-line stars will be the subject of the next paper in this series.

6.4 Observed emission line profiles

The emission line profiles can represent a combination of instrumental broadening, small absorption features which are often broadened by rotation originating from the photosphere of the star, and the emission-line profile produced by the star’s circumstellar envelope. Both emission and absorption lines may include kinematic and non-kinematic broadening from effects such as radiative transfer and Thomson scattering which affect the envelope (eg. Hanuschik, 1989). Absorption lines are generally less affected by such effects leaving emission lines to provide important information about the rotation and physical conditions affecting the star and its circumstellar envelope.

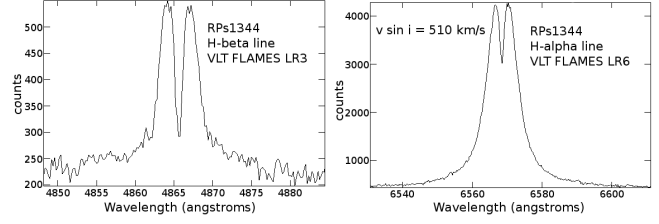


Figure 12. An example of Balmer line splitting in the high velocity circumstellar emission of RPs1344 with H β left (FLAMES LR3 grating) and H α right (FLAMES LR6 grating). The narrow profile of the shell absorption line indicates its origin closer to the outer, slowly rotating parts of the shell.

The Balmer emission lines demonstrate the most diverse range of profiles. Profile variations are believed to be dependent on the observer’s angle of inclination to the star’s pole. According to the model of Struve (1931), shell profiles occur where the star is viewed equatorially ($i = 90^\circ$), double peaked profiles occur at mid-inclination angles and singly peaked profiles occur by viewing towards the pole ($i = 0^\circ$). The measurement of accurate inclination angles, however, is complicated by other influences on the emission profile such as temperature, density and rotational velocity (Underhill & Doazan, 1982; Quirrenbach et al. 1997; Miroshnichenko et al. 2001).

We present some representative examples of Balmer emission profiles using our VLT observations. Several of the Be stars in our VLT-observed sample show some shallow double reversal more or less central to the H α line. Some stars also have emission profiles with three emission peaks. It is these fine structure components (see Figure 10) that are known to show the greatest variability, down to the order of hours (Hubert & Floquet, 1998). Stars whose emission lines have sharp, very deep absorption cores such as the example shown in Figure 11 have come to be known as *shell* stars. The intrinsic variability of Be stars, however, has proven that over time these stars can lose and regain these shell characteristics (Underhill & Doazan, 1982). We therefore refer to them as going through a ‘shell phase’ at the time of our observation. Following the convention proposed by Hanuschik et al. (1996), we formally identify a shell star where the central absorption extends below the stellar continuum.

Further to this definition, we add that this only applies to absorption on the H α line. The H β line is more dramatically affected by the atomic absorption since the reversal feature is not dependent or correlated to the strength of any individual Balmer emission line. For example, a medium absorption of H α resulting in a small reversal feature will correspondingly extend very deeply into the H β emissive flux (see Figure 12).

Asymmetry is a sub-feature found in a small percentage of Be star profiles. This is currently thought to arise from one-armed density waves in the circumstellar disk, also known as the global disk oscillation model (Silaj et al. 2010). In Figure 13 we show asymmetry where the reversal is left of centre while Figure 14 shows reversal to the right of centre, affecting both H β (left example) and H α (right example) Balmer lines the same way. The resulting emission peak on the left is known as the Violet (V) component and the emis-

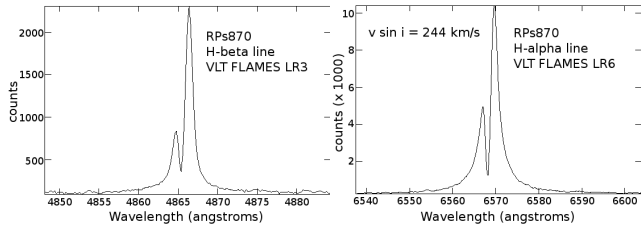


Figure 13. RPs870 is an example of Balmer line splitting which appears to the left of centre with H β left (FLAMES LR3 grating) and H α right (FLAMES LR6 grating). The peak R>V affects both hydrogen emission lines and arises from one-armed density waves in the circumstellar disk.

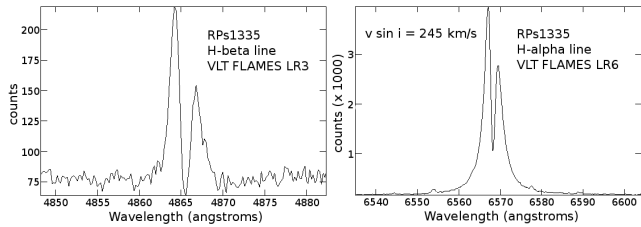


Figure 14. RPs1335 is an example of Balmer line splitting which appears to the right of centre with H β left (FLAMES LR3 grating) and H α right (FLAMES LR6 grating). In this case V>R.

sion peak on the right is known as the Red (R) component. These asymmetries are also seen in single emission-lines and are probably the result of minor or isolated density waves.

A more unusual feature among the Be star emission line profiles is the ‘wine-bottle’ shape, often produced by viewing the star near to the pole. The example shown in Figure 15 is possibly broadened by a combination of disk rotation and Thomson scattering.

In attempting to classify the profiles of H α emission according to the particular features mentioned above, it is prudent to refer only to the higher resolution VLT FLAMES data. Figures 16 and 17 provide a comparison of the VLT FLAMES LR6 and 2dF 1200R spectra for the one object. In the first comparison (Figure 16) the strong absorption feature seen in RPs1343 using LR6 on FLAMES is only de-

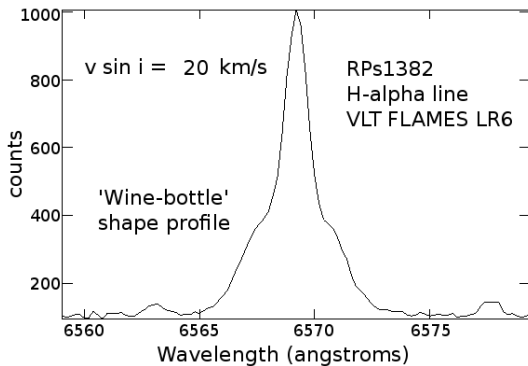


Figure 15. RPs1382 is an example of a ‘wine-bottle’ profile which may occur by viewing the rotating star close to pole-on ($i = 0$ deg angle). The low rotation velocity is a direct result this viewing angle and is measured using the central profile of the H α line (see section 7). The broadening is circumstellar.

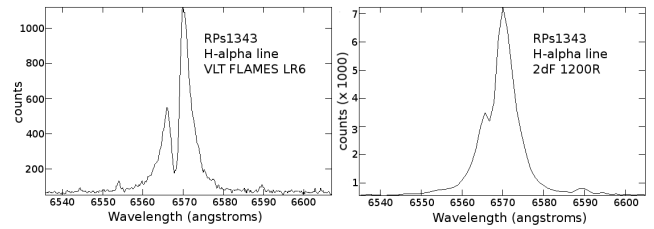


Figure 16. A comparison of H α Balmer line splitting in emission-line star RPs1343 as seen with the FLAMES LR6 R8600 grating (left) and the 2dF 1200R grating (to the right). The VLT spectrum with its increased detail provides the clear detection of line splitting and some microstructure. The 2dF spectrum is able to detect the presence of line splitting but the amplitude of the same is unable to be measured due to the lower resolution of the 1200R grating. No microstructure can be seen in the 1200R spectrum.

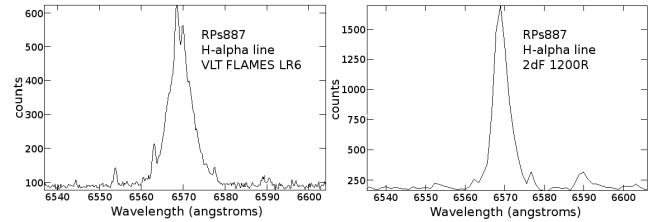


Figure 17. A comparison of H α Balmer line splitting in emission-line star RPs887 as seen with the FLAMES LR6 R8600 grating left and the 2dF 1200R grating to the right. The VLT spectrum shows fine line splitting to the top right but this cannot be seen in the 2dF 1200R spectrum which has a dispersion of 1.105Å/pixel. In this case the peaks at the top of the H α line are separated by 1.4Å, making fine detail impossible to detect at the lower resolution.

Table 4. H α profile features found in 122 emission-line stars observed with VLT FLAMES using the LR6 grating. Micro features are miniature peaks identified on the sides and at the top of a main peak.

Main feature	Total number	% of total	Number of micro features	Number of bottle shape
Single peak	100	82	11	9
Double peak V=R	10	8	2	
Double peak R>V	6	5	3	
Double peak V>R	4	3	3	
Shell	2	2	2	

tectable to a limited extent in the 2dF spectrum to the right. In the second comparison (Figure 17) the absorption feature is too narrow to be detected at a resolution of 1200R.

Using only the 122 emission-line stars observed on the VLT, the features shown in Table 4 were present. All 122 stars in this table reside within a 3 deg² region on the main optical bar of the LMC. With 100 detections, the single peak profile is the most common. At the time of spectroscopic observation, 11 stars were found to exhibit micro features such as miniature structures on the sides and/or at the peak. In time these may develop into separate peaks or disappear completely. Since emission-line stars are constantly evolving, a table such as this can only provide a snapshot of the percentage of features found at that time.

7 ROTATIONAL VELOCITIES

Classical Be stars undergo rapid rotation and possess geometrically thin, circular gaseous disks resulting in hydrogen Balmer emission (Jaschek et al. 1981; Porter & Rivinius 2003). Typical rotation compared to critical velocity (v_{eq}/v_{crit}) has been estimated at $\sim 70\%$ - 80% (Porter 1996; Porter & Rivinius 2003). A lower estimate of 40% - 60% of the critical breakup velocity for such stars was found by Cranmer (2005) but this set of data is not homogeneous. It is likely that both of these estimates may not take all the physical conditions into account. Due to fast rotation it is expected that the star is flattened, causing a variation in temperature and density from pole to equator. This is expected to result in a gravitational darkening of the stellar disk. Based on this theory, Townsend et al. (2004), employing the effects of equatorial gravity darkening, suggest that a degeneracy in the measurement of rotational rates allows Be stars to be rotating at or near their critical breakup velocity. An estimate of rotational velocity for the LMC set of emission-line stars will provide vital information for future studies.

Although the fine structure across the top of the Be star emission-line profile makes FWHM rather complex to untangle, the strength of the $H\alpha$ line negates any underlying photospheric biases or broadening. This is also true in cases where emission is weak. To derive the projected rotational velocity ($v \sin i$) we used the correlation found by Dachs et al. (1986, Equation (7)) with improvements made by Hanuschik (1989). Their three parameter correlation between FWHM ($H\alpha$), $v \sin i$ and equivalent width (EW) lead them to the relation:

$$\log[\text{FWHM}(H\alpha)/1.23 (v \sin i + 70\text{km s}^{-1})] = -0.08 \log EW + 0.14 \quad (1)$$

which was presented as equation (5) in Hanuschik (1989). We used this equation in the form:

$$v \sin i = [(\text{FWHM}(H\alpha) + 10^{0.08 \log EW + 0.14})/1.23] - 70 \quad (2)$$

to derive $v \sin i$ for all stars in our sample. The resulting relation between $\text{FWHM}(H\alpha)$ and $v \sin i$ is shown in Figure 18. The scatter is mainly due to the equivalent width of the individual line although there will inevitably be a contribution from non-kinematic line broadening due to radiation transfer (Poeckert and Marlborough, 1978), electron scattering, possible turbulence and measurement errors. The median fit to the data in Figure 18 yields

$$\text{FWHM}(H\alpha) = 0.89 v \sin i + 79\text{km s}^{-1}. \quad (3)$$

A histogram giving the frequency of $v \sin i$ for all hot emission-line stars in our LMC sample is shown in Figure 19. The distribution covers in excess of 500 km s^{-1} with a maxima at around 200 km s^{-1} . With the exception of 30 stars measured using 6dF, all the measurements were taken using the highest resolution 2dF, AAOmega and VLT data. The 30 stars measured using the 6dF red arm 0.62 \AA/pixel data cover a large range from $73 < v \sin i < 489$, indicating that the 6dF data is not introducing any bias to the overall results.

The number of stars found in the 50 km s^{-1} bin appears to be overstated in relation to the general trend seen in the histogram. This isolated rotational velocity peak probably has little to do with the spectral type or luminosity class,

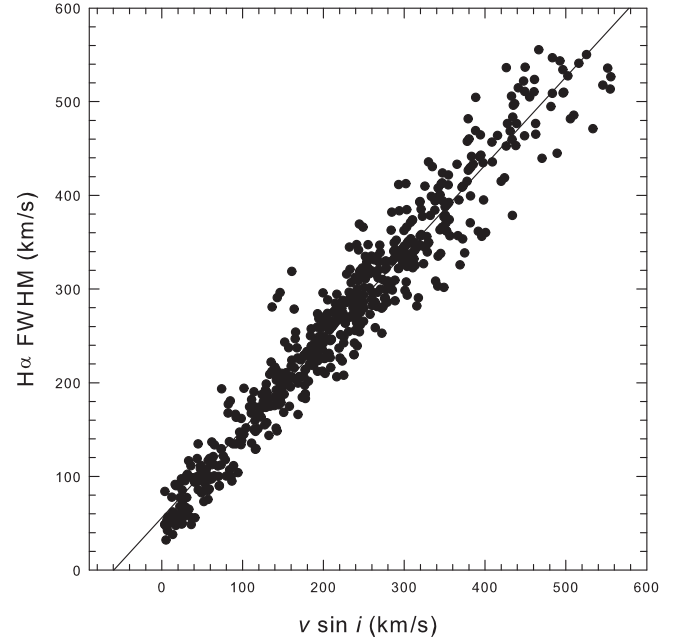


Figure 18. The relation between FWHM measured on the $H\alpha$ line and the rotational velocity ($v \sin i$) using equation (3) for all emission-line stars in our sample. The variations away from the line of equality are mainly due to the equivalent width, used to determine $v \sin i$.

both of which are quite evenly distributed across the histogram. It most likely reflects the number of stars we are viewing close to pole-on (see section 6.4), many of which do not display a strong wine-bottle $H\alpha$ emission profile. As with all surveys, the reason may also partly lie in our selection criteria, as we specifically targeted faint stars with relatively strong $H\alpha$ emission.

The process of estimating rotational velocities using FWHM and EW on $H\alpha$ emission lines which display a strong wine-bottle profile is somewhat complex. Measurement of these parameters using a line such as $\text{He}\lambda 4471$ is generally considered more accurate because it is less affected by circumstellar rotation. The extra-wide (wine-bottle profile) wings on these particular $H\alpha$ lines substantially increase both measurements, thereby giving these stars a typical rotational velocity between $200 < v \sin i < 300 \text{ km s}^{-1}$.

We have found that by measuring FWHM and EW on the $\text{He}\lambda 4471$ absorption line, or by fitting a gaussian curve to the $H\alpha$ wine-bottle profile, the rotational velocity readings drop substantially to levels below 100 km s^{-1} . Since both methods of measurement yield similar results ($5 < v \sin i < 40 \text{ km s}^{-1}$), we prefer to fit a Gaussian profile to the $H\alpha$ line. This is expected to produce the most accurate measurement of FWHM, EW and $v \sin i$ using these peculiar profiles. It not only constrains all FWHM and EW measurements to the $H\alpha$ line for direct comparison across the table (Appendix Table 1) but improves reliability due to the strength of $H\alpha$ compared to the $\text{He}\lambda 4471$ absorption line, which is weak, difficult to fit and often perturbed by the envelope.

After selecting LMC Be stars between classes B0 and

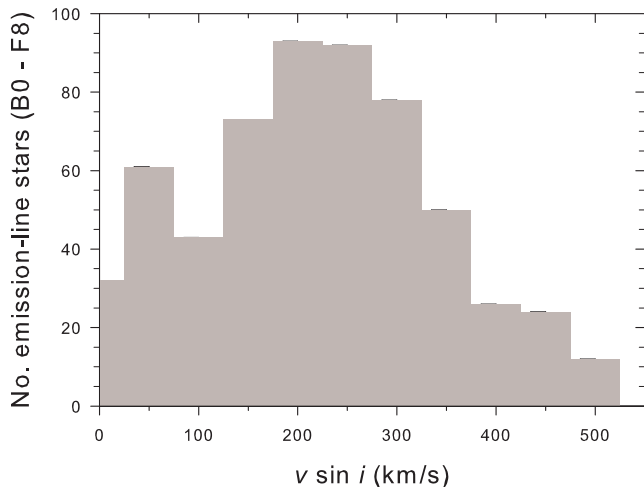


Figure 19. The distribution of estimated rotational velocities ($v \sin i$) for all the hot emission-line stars (B0 - F8) in our survey. The large number of stars occupying the bin at 50 km s^{-1} is most likely due to their near pole-on angle to our line of sight.

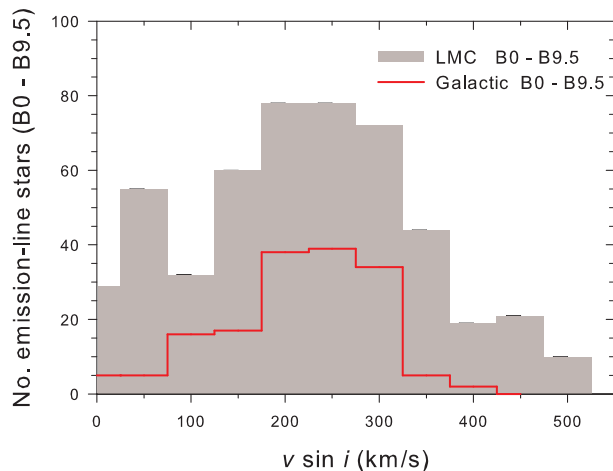


Figure 20. The distribution of rotational velocities ($v \sin i$) for all Be stars (B0 - B9.5) in our LMC sample compared to the distribution for Galactic Be stars (B0 - B9.5) found by Slettebak (1982).

B9.5, we have compared their distribution to the distribution found in the Galaxy for the same Be classes using data from Slettebak (1982). From the histogram in Figure 20 we find a correlation coefficient of 0.88 between the LMC and Galactic data sets. Although both data sets are not complete in any sense, the plot indicates that, based on a random selection, the majority of Be stars have a projected rotational velocity between $200 < v \sin i < 300 \text{ km s}^{-1}$.

8 NEBULA CONTRIBUTION

Approximately 15 percent of the emission-line stars in our sample are B[e] stars which show evidence of forbidden nebula emission lines such as [Fe II] $\lambda 4244, 4287, 4415, 5273, 7155$, [N II] $\lambda 6583, 6548$, [O I] $\lambda 6300, 6363$, [O II] $\lambda 7320, 7330$ and [S II] $\lambda 6716, 6731$ in their spectrum. Importantly, not all of these lines are necessarily to be found in every B[e] star but the most common are [Fe II] and [O I]. These stars are often associated with ambient or extended nebula emission which is ionised by the central star with surface temperatures of between 10,000 K and 33,000 K. This means that the H α line may be a combination of central star and nebula emission, making them difficult to separate when the RVs of each component are similar and/or when spectral resolution is not sufficient to distinguish the components.

Since the strength of the H α line in each star and the ambient background H α emission affecting the spectrum are constantly changing with location in the LMC, a general sky subtraction may be insufficient in some cases. Each object located in an area of diffuse H II emission must therefore be individually assessed for ambient nebula contribution on the basis of H α emission within a 10 arcsec radius of the star, which provides a fair estimate in the crowded regions of the LMC. This can be closely approximated using our deep H α map. The measurement of H α intensities on and off the emission-line star produces a ratio which roughly indicates the percentage of H α spectral flux emitting from the star. If the background emission is deemed to be contributing more than 10% of the measured flux, a special note about the B[e] status is made in the comments column of Appendix Table 1. If there is no ambient emission surrounding or in the immediate vicinity of the star, we may safely assume that the star is of the B[e] variety, where we expect to find emission-lines of [N II], [S II], [O II] and even [O III].

In Figure 21 we show an example of a B[e] star with a very significant contribution of emission lines normally associated with nebulae. Where emission lines are this strong we examine the immediate environment for ambient nebula emission. If the deep H α image shows us that much of the emission is environmental, we flag (in the comments column) that the other emission lines in the spectrum may be the result of ambient emission. In Figure 22 we show a regular B[e] star with some nebula lines present but no apparent environmental contribution requiring correction. Finally in Figure 23 we show a Be star requiring no nebula subtraction for environmental reasons and no nebula lines. All of these stars are located within a 1 degree radius of each other, emphasising the importance of surveying the immediate location of each star.

9 NEW ACCURATE POSITIONS FOR LMC EMISSION-LINE STARS

We found that emission-line star positions provided by many earlier surveys (mostly using the FK4 system) were not sufficiently accurate when converted to the J2000 equinox and compared to positions across our astronomically accurate survey. As many as 138 previously identified emission-line stars were only published with an accuracy to one decimal fraction of a minute. The majority of these also gave no

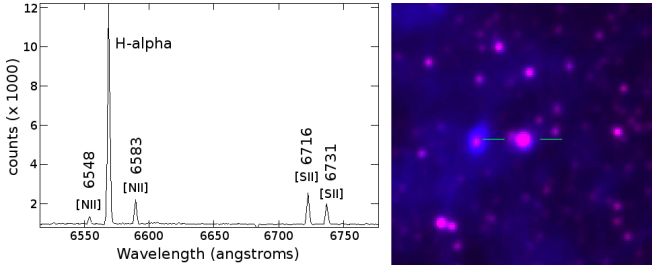


Figure 21. Left: A 2dF 1200R grating example of the red spectral region around the H α line in B[e] star RPs226 where there is strong emission from [N II] λ 6583,6548 and [S II] λ 6716,6731. Right: We show the H α (blue) and short red (red) combined UKST image, clearly showing the local environment and the contribution from ambient nebulous flux. Using the H α map alone we can estimate the proportion of nebula contribution by using the Starlink GAIA task to measure the ambient H α (sky) emission within 10 arcsec (~ 2.4 pc) of the star and compare the flux to that at the rim of the star, which represents the H α excess (H α -R) emission from the star. The object, 2 arcsec to the east of RPs226 (immediate left in the image) is RP225, a compact HII region.

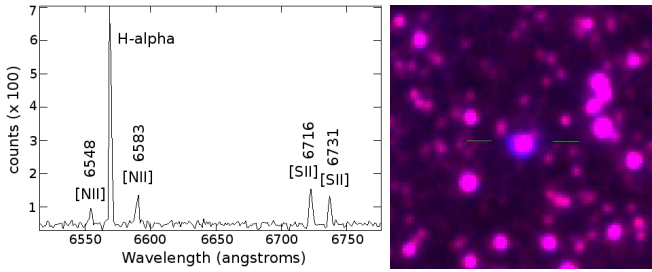


Figure 22. Left and right images as described in Figure 21 above. This is an example of a B[e] emission-line star (RPs161) with nebula lines present but no contribution from ambient emission at the stars location. No correction to the H α flux is required.

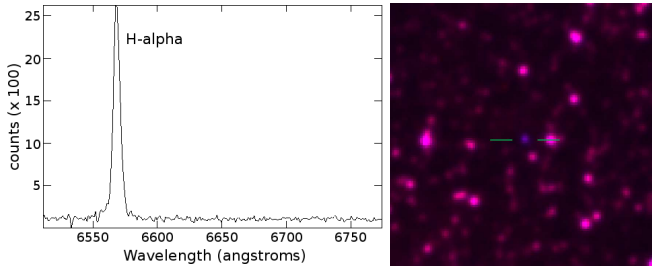


Figure 23. Left and right images as described in Figure 21 above. An example of a Be emission-line star (RPs634) not requiring any correction to the measured H α flux. No standard nebula forbidden emission-lines are detected and the environment is free of low level ambient emission.

seconds in DEC. Many true positions were uncertain given the crowded nature of the LMC. In many cases the known emission-line star had to be carefully verified as the object that was previously found. The K-view program in KARMA initially allowed us to find the position of peak intensity of any point source within the stacked H α /SR images allowing accurate positioning to 0.6 arcsec due to our meticulous calibration of our entire map with the SuperCOSMOS world coordinate system.

To improve the positioning and find the most accurate

positions for our new emission-line stars, we extracted red image data from the SuperCOSMOS Image Analysis Mode (IAM). The SuperCOSMOS plate measuring machine samples some 1,000 objects within 10 x 10 arcmin areas in order to define the xy-to-RA/Dec transformation. The resulting coordinates of a given pixel are thought to be accurate to a few tenths of an arcsec. Using both the H α /SR discovery images and accurate SuperCOSMOS image positions, we matched each emission-line star to the position provided by the IAM data. This match also allowed us to extract the SuperCOSMOS derived B and R broadband magnitudes for each star, as discussed in section 12.

10 RADIAL VELOCITIES

Stellar radial velocities for hot B stars are useful for kinematic studies within the LMC. They provide a valuable tool with which to compare young and old populations. Importantly, the radial velocities allow us to verify that our selected emission-line stars reside within the LMC.

Our stellar radial velocities were determined from the medium resolution 2dF 1200R, 6dF 425R and FLAMES spectra as described above. The largest number of velocities (92%) were measured using the 1200R 2dF grating which has an estimated accuracy of ± 4 km s $^{-1}$. Two different methods of velocity measurement were employed in order to reduce errors arising as a result of the application of a particular technique. These techniques have been described in Reid & Parker (2006b) and will only be repeated briefly here.

Initially, we used the IRAF EMSAO technique for measuring multiple, specified emission lines. Wavelengths for 13 common emission-lines within the λ 6200-7350Å range were specified to three decimal places. The program found the central position of each available line which was independent of the line width and self-absorption features. It then applied a weighted gaussian fit to each emission line dependent on its intensity, derived a weighted average across the spectrum and corrected for the heliocentric velocity. The EMSAO-derived velocity for each star was displayed and examined.

The second method of velocity determination involved the cross-correlation technique using XCSAO in IRAF (Kurtz & Mink, 1998). This method requires a list of template spectra with low internal velocities and accurately determined published radial velocities against which all the other spectra may be compared for measurement. Template emission-line velocities were based on a minimum of four lines, with at least two of these being fitted by EMSAO (Kurtz & Mink, 1998). Twenty LMC planetary nebula and emission-line star templates with well established velocities were chosen for the cross-correlation.

To derive a best possible radial velocity from our emission-line and cross-correlation methods, we examined the error and other properties (such as the fit and number of lines used) relating directly to each measurement system. From EMSAO, we used weighted velocity results where a large proportion of fitted lines were used in the compilation and error values ≤ 13 km s $^{-1}$. These error values sum and weight the difference in emission line velocities for a given object. Errors larger than this value begin to result from increasingly complex shell velocity structure. Error values up to 13

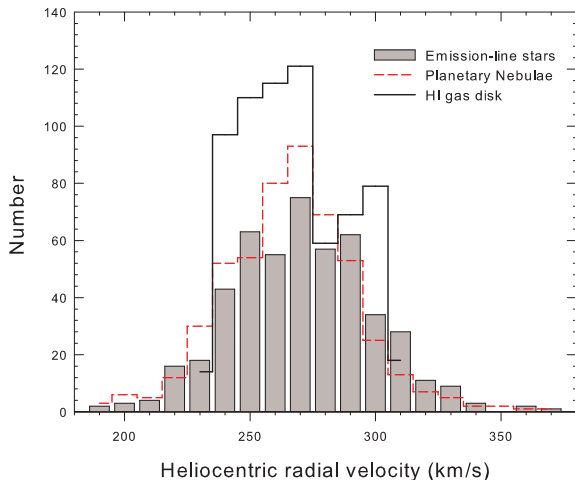


Figure 24. The distribution of LMC emission-line star velocities in our survey is shown by number and compared to the distribution for PNe and the HI gas disk. All sources have been placed into 10 km s^{-1} heliocentric radial velocity bins. The emission-line stars lie within the range found previously for LMC PNe and H II regions which is about 40 km s^{-1} wider at each end than the HI distribution. All three distributions share a mean peak number of sources at 270 km s^{-1} . The HI has a sudden trough after the peak (280 km s^{-1}) due to a warp which lies north of the main bar along the line of nodes (see Reid & Parker 2006b).

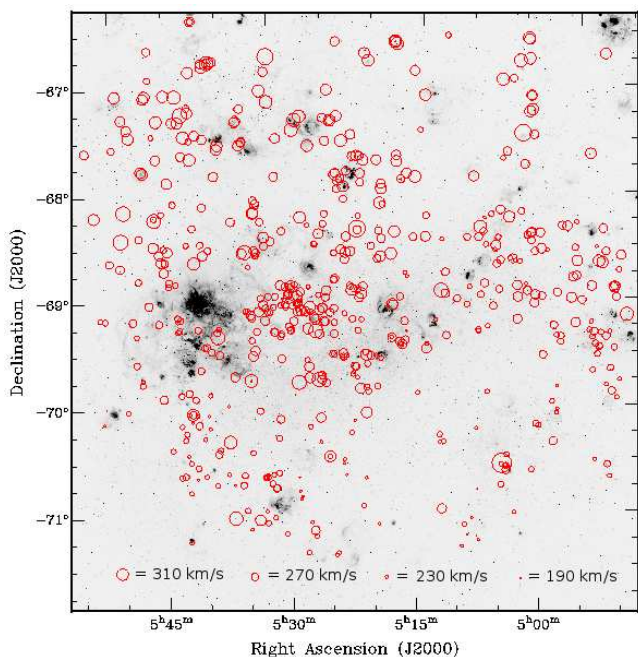


Figure 25. An $\text{H}\alpha$ map of the central 25deg^2 region of the LMC showing the distribution of hot emission-line stars as open red circles, the size of which indicates the measured heliocentric radial velocity. The larger the diameter, the higher the velocity. The circle sizes represent a linear scale but are magnified $10\times$ in order to emphasize similarities and contrast the deviations within selected areas. Similar to the HI gas disk, the PNe and H II populations, there is a noticeable gradient from high velocities NE of the main bar to low velocities SW of the main bar. The average velocity of 270 km s^{-1} for emission-line stars is also common to all three populations on the main bar.

km s^{-1} were to be expected using this technique, as velocity ratios between different lines (eg. $\text{H}\alpha$ and $[\text{N II}]\lambda 6583$) can vary depending on shock waves within the surrounding shell and/or in a few cases, ambient emission surrounding the star. In the cross-correlation technique, we looked for high correlation peaks and low error values $\leq 2\text{ km s}^{-1}$. In general, we favoured the cross-correlation technique since $>50\%$ of the target stars show only Balmer lines in emission and in many cases a weighted result was not possible with EMSAO. Results from EMSAO were used where errors from the cross-correlation were above 13 km s^{-1} .

A small percentage of these radial velocities will combine the true radial velocity with stellar atmospheric effects where the envelope is undergoing a phase of contraction or expansion. The contribution from these motions, unlikely to be much more than 50 km s^{-1} , will not unduly displace these stars away from their location in the LMC. The Balmer and shell lines used for our radial velocities are formed in the cooler outer atmosphere. The lower order $\text{H}\alpha$ line is formed in the outer layers of the atmosphere and is less affected by the large velocity variations which can affect the higher members of the Balmer series which are formed at the deepest layers of the envelope. According to the Struve's (1931) model, the mass flux of the star and its excitation steadily decreases towards a distance of several stellar radii where the emission lines are formed.

Our velocities, measured in the envelope, are lower than the escape velocity at the photosphere for stars with high $v \sin i$ found from photospheric He I lines, which are in turn broad, weak and often perturbed by the envelope. Since each emission-line star is individualistic in terms of its $v \sin i$, shell structure, phase, periodic and non-periodic radial motions and amplitudes, a weighted average and cross-correlation of the emission line in the outer atmosphere is the most efficient and accurate means of applying a radial velocity to each emission-line star in our catalogue.

In figure 24 we show a histogram of the heliocentrically corrected radial velocities for 501 of the hot emission-line stars in our survey. These are compared with our heliocentric velocities for 515 LMC PNe (Reid & Parker, 2006b) and 686 HI gas disk pointings from the LMC map of Rohlfs et al. (1984), covering the entire 25deg^2 survey region. Each pointing averages an $\sim 11.45\text{ arcmin}^2$ sub-region, ensuring an unbiased and fully representative distribution and mean can be obtained. The comparison shows that emission-line star velocities lie within the acceptable velocity boundaries and conform well with other LMC population types such as PNe and the HI gas (also see Reid & Parker, 2006b).

LMC emission-line stars and PNe have a very similar distribution but a wider range compared to the HI disk. Although 483 (89%) of the emission-line stars occupy the HI range 230 km s^{-1} to 310 km s^{-1} , the 52 outliers are to be expected since the HI disk has a narrow vertical velocity dispersion ranging between 17 km s^{-1} and 2.2 km s^{-1} with a mean of 6 km s^{-1} compared to PNe (45 km s^{-1} to 3 km s^{-1} ; mean 22 km s^{-1}) and emission-line stars (43 km s^{-1} to 3 km s^{-1} ; mean 23 km s^{-1}), found by sampling $37 \times 37\text{ arcmin}$ sub-regions across the survey area. A few large dispersions in HI can indicate a splitting of the gas disk, which occurs in regions such as the leading arm (see Reid & Parker 2006b). The central peak of 270 km s^{-1} is common to all three distributions and indicates a strong midpoint incorpo-

rating both young and old populations. The sudden trough at 280 km s^{-1} for the HI gas disk is further proof of a sharp warping of the disk which runs north of the main bar in a SE to NW direction, close to the line of nodes (see Reid & Parker 2006). This warping produces a large velocity dispersion and fewer velocities at the 280 km s^{-1} level. Figure 25 clearly shows proportionally higher velocities for emission-line stars north-east of the main bar and lower velocities south-west of the main bar. This overall gradient is shared by PNe, HII regions and the HI disk but PNe, HII regions and emission-line stars have a greater vertical dispersion at any point than the HI disk.

The common peak velocity ($270 \pm 30\text{ km s}^{-1}$) does not necessarily mean that each population shares the same center of rotation. In fact the rotational centre for PNe and the HI disk have been shown to be located in separate positions (Reid & Parker, 2006b). What we can see from Figure 25 is that $270 \pm 30\text{ km s}^{-1}$ is the average velocity for emission-line stars in the main bar region.

11 DISTRIBUTION ACROSS THE LMC SURVEY AREA

In figure 26 we show the distribution of emission-line stars, superimposed on an $\text{H}\alpha$ map of the central 25deg^2 region of the LMC. The surveyed Be stars in the region are shown as filled red circles while M giants are shown as open blue circles.

Much of the resulting distribution depends on our selection criteria since we were searching for compact emission objects and emission stars fainter than $\text{Mag}_R = 14$. For this reason, the most luminous emission-line stars detected in the $\text{H}\alpha$ survey were not spectroscopically observed. Objects were selected for spectroscopic follow-up based on the strength of the $\text{H}\alpha$ emission relative to the luminosity of the central star. Stars with low ($<5\%$ the central star) $\text{H}\alpha$ excess were not spectroscopically followed up as their low variability and/or emission excess over the 3 year duration of the survey indicated that they were not strong emission-line star candidates. Where the criteria were met, we extended the selection to the faintest luminosity candidates we could find. Emission-line stars found in clusters and associations were only earmarked where related velocities or previous published work make the association clear.

The densest distribution of B-F emission-line stars occurs across the main bar. From there they form a line northwards, following the line of nodes (see Reid & Parker 2006b). There is also a large number to be found along the leading arm, south of 30DOR. Being a young population of stars, they trace the more recent star formation regions and HII distribution quite well compared to the older population of PNe, which are more randomly distributed within the LMC (see Reid & Parker 2006b). The somewhat older M population, however, is more evenly distributed across the north and main bar of the LMC. There is a denser distribution of late-type stars along the leading arm which is thought to be a remnant of the LMC's close encounter with the SMC which may have occurred $\sim 2 \times 10^8$ years ago (Murai and Fujimoto, 1980).

12 $\text{H}\alpha$ LUMINOSITY EFFECTS AS A FUNCTION OF SPECTRAL TYPE

The theory of equatorial darkening suggests that a degeneracy in the rotational rates allows Be stars to be rotating at or near their critical breakup velocity, Townsend et al. (2004). This implies that there will be a maximum mass and hence, luminosity, allowable for a Be star. The question then arises as to whether the intensity of $\text{H}\alpha$ emission from these stars relates to the luminosity class for each star. In other words, does the intensity of $\text{H}\alpha$ emission increase in hotter stars? To answer this we have constructed the first ever $\text{H}\alpha$ luminosity histogram as a function of spectral type for Be stars, using our sample in the LMC. It is based on measuring the total flux emitted in the $\text{H}\alpha$ line over and above the continuum level in each star.

In order to do this, measured $\text{H}\alpha$ fluxes were converted to the $\text{H}\alpha$ magnitude scale by correlating the $\text{H}\alpha$ flux from known emission objects with no continuum and no [N II] contamination against well established $\text{H}\alpha$ magnitudes for those objects. A zero point scale was then found in order to convert all $\text{H}\alpha$ fluxes to $\text{H}\alpha$ magnitudes. This allows comparison to other luminosity functions, such as the planetary nebulae luminosity function, which is already extensively used for distance determination.

This inaugural conversion of $\text{H}\alpha$ fluxes to magnitudes was made by choosing PNe with published HST-derived fluxes and 2dF spectra where the PN showed no measurable [N II] $\lambda 6548$ & $\lambda 6583$ but were bright enough to be seen in broad-band R. PNe were chosen because the continuum level is close to zero, allowing the measurement of $\text{H}\alpha$ emission only. Each PN was located in the $\text{H}\alpha$ map data and an R-band image with an area of 0.1 arcmin radius around each PN was downloaded from SuperCOSMOS online. Along with the image, the IAM data 'tab' file was also downloaded. This file contains precise object positions and R magnitudes from the SuperCOSMOS sky survey and the ESO guide star catalogues. These magnitudes were graphed (see Figure 27) against our calibrated LMC PN fluxes (Reid & Parker 2010) and fluxes from the MCPN catalogue (Stanghellini et al. 2002).

The fit is sufficient to reveal the position of the line of best fit which will be used to perform the conversion. The scatter, up to half a magnitude, seen on either side of the logarithmic line of best fit is to be expected due to the limited linear response of the digitized film and characteristics of the $\text{H}\alpha$ filter used on the UKST but does not pose any problem to the calibration of fainter objects since the AB magnitude scale is always fixed at $2.5 \log(F_{\text{H}\alpha})$. The logarithmic relation of flux to magnitude means that the slope of the line of best fit will always be fixed. The graph is simply used to attain the magnitude conversion value, which is the final number in the empirical relation:

$$m_{\text{H}\alpha} = -2.5 \log F_{\text{H}\alpha} - 14.15 \quad (4)$$

for the conversion of all the derived $\text{H}\alpha$ fluxes ($\text{ergs}^{-1} \text{cm}^{-2} \text{s}^{-1}$) into $\text{H}\alpha$ apparent magnitudes ($m_{\text{H}\alpha}$). A mean error estimate of ± 0.27 mag is based on line measurement and flux calibration errors at a total 7% plus 0.1 mag for uncertainties in image photometry.

To check the veracity of this calibration, we used the

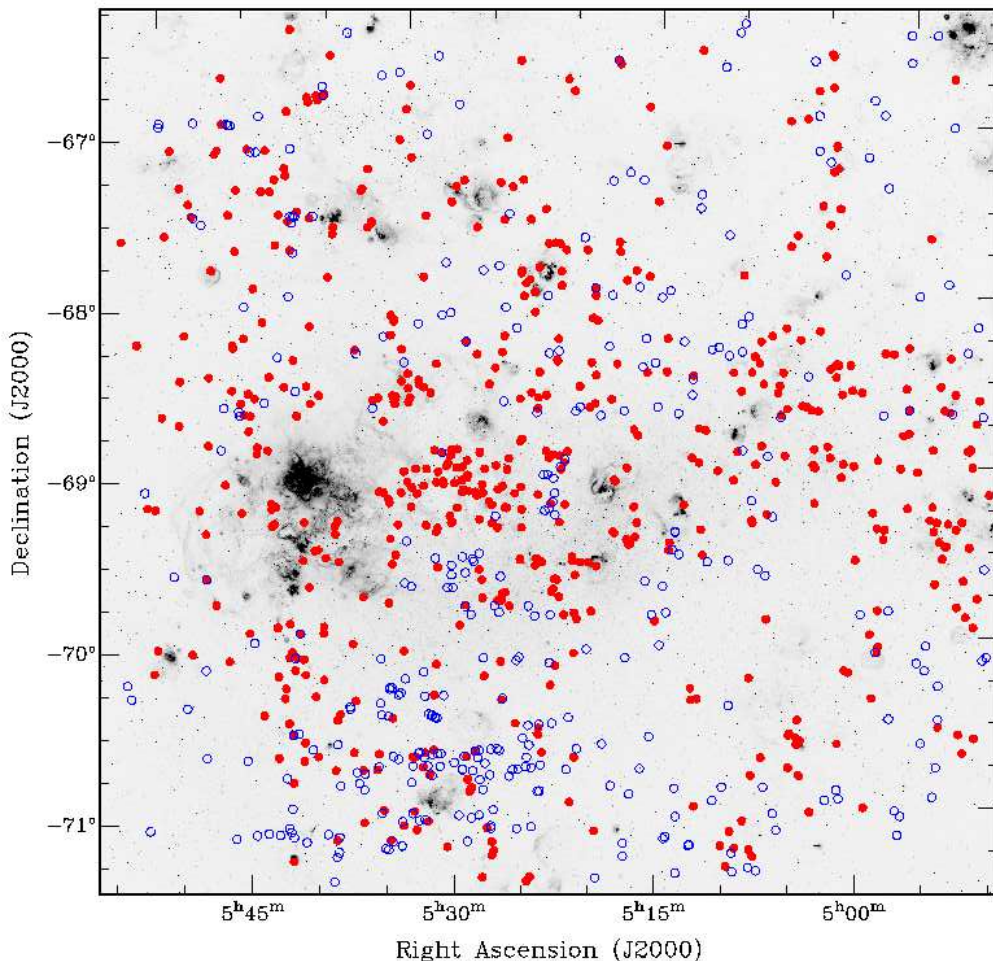


Figure 26. An $H\alpha$ map of the central 25deg^2 region of the LMC showing the distribution of hot emission-line stars as filled red circles. The positions of late-type (mostly M-giant) stars are shown as blue open circles. Stars less than 10 arcsec apart cannot be distinctly separated by the large markers in this image. There is a significant concentration of hot emission-line stars on the immediate north-eastern side of the main bar while M-giants are concentrated to the south.

ESO magnitude-to-flux converter² to convert $H\alpha$ fluxes in $\text{ergs}^{-1} \text{cm}^{-2} \text{s}^{-1}$ to $H\alpha$ magnitudes, using a variety of narrow band filters. Using the accepted flux-to-mag conversion of $-2.5 \log F_{5007} - 13.74$ for $[\text{O III}]\lambda 5007$ emission lines (Jacoby 1989), we simulated a variety of narrow band filters and telescopes and found that any given flux value will be between 0.4 and 0.58 mag brighter in $H\alpha$ than in $[\text{O III}]\lambda 5007$. With our magnitude correction of -14.15, a given flux will be 0.41 mag brighter in $H\alpha$ than in $[\text{O III}]\lambda 5007$, in basic agreement with ESO simulations, giving us added confidence in our new empirical relation.

Using this conversion we constructed the $H\alpha$ luminosity function, which is a measure of the $H\alpha$ emission above the continuum and is presented in terms of the each stars' spectral classification (see Figure 28), a relation which has been unknown to date. The figure shows only a modest increase in $H\alpha$ luminosity with increasing spectral type over a 9 magnitude range. The spectral type or temperature of the star therefore does not correlate strongly with the luminos-

ity of the Balmer emission. As expected, however, classes B0 to B3 dominate the bright end while classes B6 to F9 can mainly be found at the faint end. The bright cutoff occurs at magnitude 15 (an absolute magnitude of -4.5) and the peak in the function (the largest number of stars in any particular bin) occurs at magnitude 18.6. After this peak there is a steady decrease in the distribution over the next 5 magnitudes to the faintest detection at magnitude 23.8. The lone star with a bright $H\alpha$ magnitude of 14.6 is a luminous blue variable (LBV). The shape of the distribution is not unlike that for planetary nebulae in the LMC (see Reid & Parker 2010) but it is unlikely that this function can be used as an extra-galactic distance scale as the brightest $H\alpha$ emission line is a magnitude fainter than the brightest $[\text{O III}]\lambda 5007$ line from PNe in the LMC which is traditionally used for the PNLf.

13 PHOTOMETRY

We obtained B, V, I magnitudes from OGLE-II photometry for 54 previously known Be and B[e] stars which were

² <http://archive.eso.org/apps/mag2flux/>

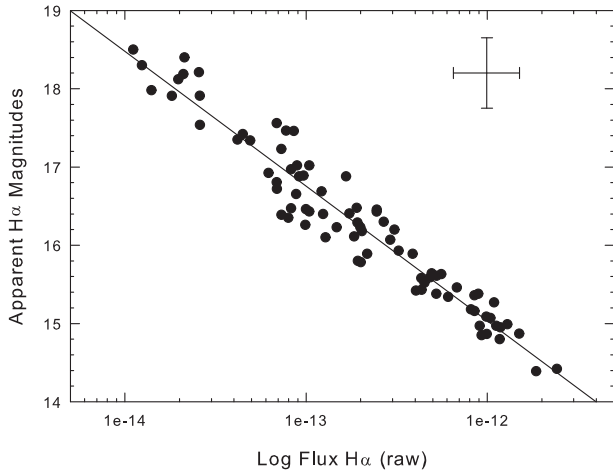


Figure 27. The graph, based on our LMC PN sample, used to convert $H\alpha$ flux to $H\alpha$ magnitude. The apparent $H\alpha$ magnitudes for LMC PNe were measured using image photometry on the stacked $H\alpha$ map. Only PNe with extremely low or no $[N II]6548$, 6583\AA lines were included in the calibration since the presence of these lines in the wings of the filter can effect the $H\alpha$ measurement. The $H\alpha$ fluxes are from our calibrated 2dF and longslit fluxes for the same PNe. Calibrated this way, there is no need to subtract continuum from the $H\alpha$ line. The scatter is expected due to the limited linear response of the digitised photographic data used to create the $H\alpha$ map. The line of best fit is shown on the graph and the underlying algorithm is provided at equation 4.

found to have strong variability. To this number we add 63 newly discovered Be stars with published OGLE-II photometry (Szymański, 2005, Udalski et al. 2002), found from the limited OGLE coverage of the main bar only. For other stars not in the OGLE data base we gained I, B and R photometry from SuperCOSMOS. The Starlink GAIA image detection option was used to detect and isolate sources by placing an ellipse around the assumed centre. For single stars found in relative isolation this works extremely well. For other sources with close companions or within clusters, the de-blending option was employed. The position of each star was manually checked against the downloaded image to ensure accuracy of positioning and non-blending.

To supplement the OGLE-II V magnitudes we also include GSC2 V magnitudes from ESO. We warn the user to use care in comparing the three photometric sets directly against each other due to intrinsic variability and the change of epoch between the three surveys. Unless specified, we only compare OGLE-II photometry in this section since the published values are an average across the survey period.

13.1 V vs (B-V) colour-magnitude diagram

B stars congregate at the upper left of the traditional H-R colour-magnitude diagram, close to a 0 B-V colour and where the tracks for main sequence, subgiant and giant stars converge. This area of the H-R diagram is a useful test for our Be stars for two reasons. Firstly, by separating giants from main sequence stars, we can independently test our correlated estimates for luminosity class. Secondly, we can

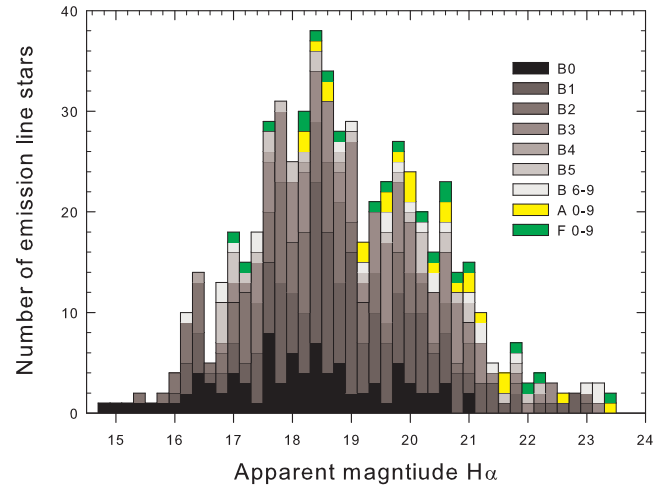


Figure 28. The luminosity function of $H\alpha$ emission from hot emission-line stars found in our survey within the central 25deg^2 region of the LMC. The luminosity bins are 0.2 magnitudes and spectral classifications are indicated in the legend.

see if the variability of these stars is having any effect on the normal position for these stellar classes.

The V versus (B-V) magnitudes for a sample of 100 of our LMC emission-line stars is shown in Figure 29. These magnitudes are derived from OGLE-II photometry where the variability of these stars has been established. Their position on the diagram includes corrections for foreground and intrinsic reddening within the LMC. These reddenings were obtained from the Strömgren CCD photometry on LMC fields conducted by Larsen et al (2000) using B stars. Although several of the stars in this small sample exhibit a strong reddening, only 3 of them - RPs83, RPs1751 and RPs1350 - are visibly surrounded by extended emission halos (≥ 6 arcsec radius). Rather than applying a small reddening to each individual object, we adopt an uncertainty of ± 0.10 for all of these stars since they are close to or on the main bar (Larsen et al. 2000). The stars are separated into main sequence (open red circles) and giants (filled black circles) in Figure 29 where the position of the intrinsic (observed) zero point for (B-V) is shown as a broken vertical line.

The plot indicates that the cross-correlation technique appears to be working very successfully. Main sequence stars appear to be spread across the plot at a broad 45 degree angle from the lower right, following the established track for main sequence stars. Giants on the other hand span across the centre of the plot to the left where they increase in V magnitude.

13.2 $H\alpha$ emission

A correlation has been found between the strength of $H\alpha$ emission and the spatial extent of the emitting region of a Be star (eg. Quirrenbach et al., 1997, Tycner et al. 2005). The $H\alpha$ emission is also thought to be correlated with the observed colour excess (Dachs et al. 1988) where an increase in both $H\alpha$ emission and the colour excess $E(B-V)$ will oc-

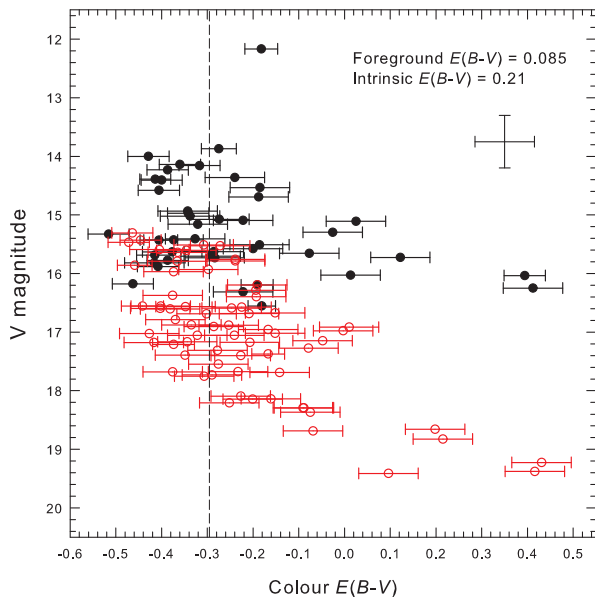


Figure 29. The V versus $E(B-V)$ colour-magnitude diagram from OGLE-II photometry for 117 variable hot emission-line stars found on the LMC main bar. Main sequence stars are assigned red open circles while giant stars are represented by filled black circles. We assume a combined foreground and intrinsic reddening of $E(B-V) = 0.295$. Error bars are based on a combination of B and V published error estimates for B stars on or very close to the main bar. Maximum errors on both scales are shown. The observed position of $(B-V) = 0$ is shown by the broken vertical line.

cur with a larger contribution from bound-free and free-free continuum emission (Beaulieu et al. 2001). For Be stars in our LMC sample, we also find a mild correlation between the Balmer line radiation originating from the stellar envelope as exhibited by $H\alpha$ equivalent width $EW(H\alpha)$ and the $(B-V)$ colour indices. This relation is shown in Figure 30 where the correlation is strongest at low $EW(H\alpha)$.

The increasing scatter with increasing $EW(H\alpha)$ is partly due to increased reddening from interstellar dust and emission from the circumstellar gas envelope, and partly due to complex variations in the $H\alpha$ emission profiles between the time of our spectroscopic observations and the OGLE-II observations. Since the measured $EW(H\alpha)$ is an integrated quantity, it has the tendency to be insensitive to the small-scale variations in the line profile. Effects from OGLE-II photometry, where the LMC was observed repeatedly between 1997 and 2000 will mostly correspond to our 12 $H\alpha$ stacked images, also observed between 1997 and 2000. The average of these photometric variations over 3 year timescales was applied to our spectroscopic observations conducted in 2004 and 2005. Since $(B-V)$ has been averaged out over timescales of years, this ratio is not expected to vary greatly with variation of the star's intrinsic luminosity. For the most variant objects, our spectroscopic measurements of the $H\alpha$ line require slightly larger error margins but re-

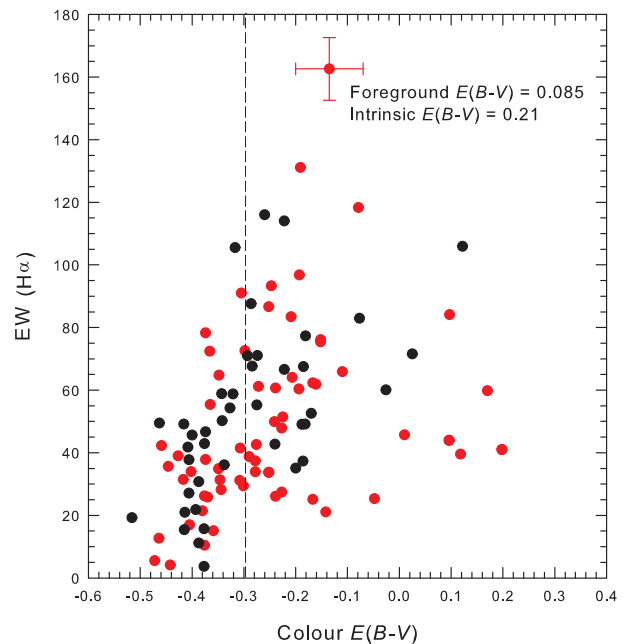


Figure 30. The equivalent width ($H\alpha$) versus $E(B-V)$ colour diagram using our measured $H\alpha$ magnitudes and averaged OGLE-II photometry for 100 variable Be stars in the LMC sample. We assume a combined foreground and intrinsic reddening of $E(B-V) = 0.295$. Error bars are based on a ± 0.10 estimated error for B stars on or very close to the main bar. The observed position of $(B-V) = 0$ is shown by the broken vertical line. There is a mild correlation up to $E(B-V)$ of ~ -0.3 but as the colour index increases the relation breaks down. Giant stars are again shown in black and main-sequence stars are shown in red.

main impossible to estimate without repeated spectroscopic exposures.

Despite these caveats, a mild correlation is still evident. The decrease in the maximum observed value of $(B-V)$ with increasing $EW(H\alpha)$ is one of the main features. It implies that cooler stars will have larger emission shells with a probable maximum size allowable for each spectral class.

In Figure 31 we replace the $EW(H\alpha)$ with the $H\alpha$ emission flux above the continuum. There is no correlation evident, however, the range in $(B-V)$ appears to broaden with decreasing flux suggesting that low $H\alpha$ flux can be present in both the brightest and faintest Be stars.

Figure 32 shows that the $H\alpha$ magnitude is almost consistently fainter than the V magnitude of the star by a mean of 2.72 ± 1 mag. The correlation coefficient between the $H\alpha$ and V magnitudes for our set is only 0.578, implying that the V magnitude of any particular emission-line star could be associated with a wide range of $H\alpha$ flux excess. Figure 32 shows that this could be up to 3 magnitudes either side of the mean correlation, which is $V_{mag} = H\alpha - 2.72$.

The main body of available V magnitudes cease at $V=18$ due to the limit of the ESO catalogue. OGLE-II magnitudes extend to fainter limits. Stars intrinsically fainter than $V=18$ include a wide variety of spectral types so it may be that many of them were undergoing a strong emis-

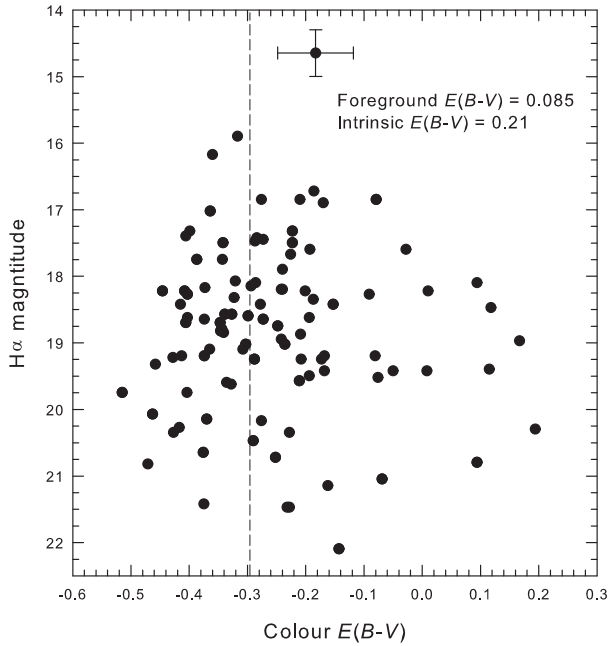


Figure 31. The $H\alpha$ emission from stars in the LMC is compared with their $E(B-V)$ colour. No real correlation between the $H\alpha$ magnitude and colour index can be seen. The magnitude of the $H\alpha$ emission is therefore somewhat independent of the $E(B-V)$ colour of the host star. Similar to Figure 30, however, the minimum observed $E(B-V)$ colour appears to increase with increasing $H\alpha$ magnitude above magnitude 20.

sive phase at the time of our spectroscopic observations. The effect of $H\alpha$ flux variability upon V magnitude is impossible to estimate, however we may assume that a portion of the scatter away from the line of best fit may be due to oscillations.

The emission-line stars in figure 32 have been separated into giants and main sequence classifications in order to investigate their positions on the H-R diagram according to luminosity class. As expected, the giants dominate the bright end and the main sequence stars dominate the faint end of the plot. The overlap region of ~ 2 magnitudes from $V=14.7$ to $V=16.7$ contains about 15 main sequence stars with rather low $H\alpha$ emission. There is nothing peculiar that these stars have in common. Their spectral types range from B1Ve to A6IVe. The size separation either side of the overlap region (V_{mag} 16.7-14.7) is very robust, permitting a secure size assessment to be made based on V magnitude alone.

14 VARIABILITY

The variable nature of Be and B[e] stars is an important feature which relates to the physical stability of the star. As a phenomenon, it has been known for more than a century and may be due to various combinations of physical properties, one or more of which may undergo a transition. Suggested mechanisms are mass loss through stellar winds, rapid ro-

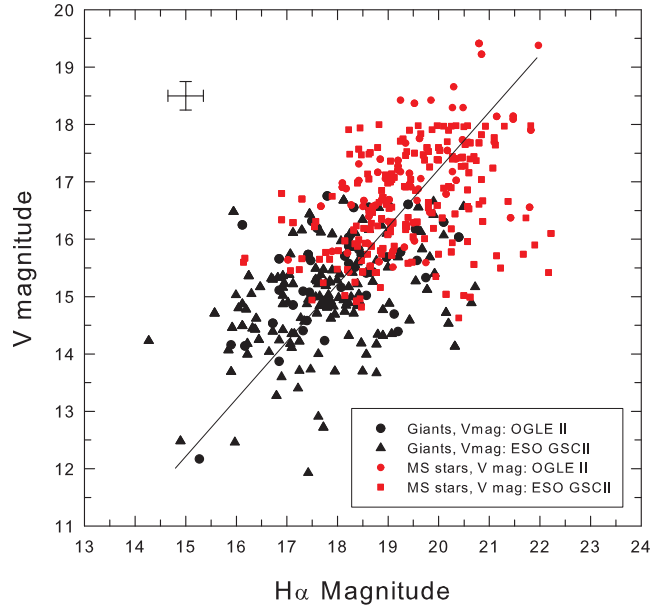


Figure 32. The luminosity of $H\alpha$ emission from stars in the LMC is compared with their V magnitude. Giants and main-sequence stars are separated and assigned black and red colours respectively. A mild correlation can be seen down to the faint cut-off of $V=18$ for the ESO dataset. The linear line of regression indicates that $H\alpha$ magnitudes are generally 2.72 magnitudes fainter than the visual magnitude for these stars. The correlation coefficient is 0.578 and the equation: $V_{mag} = H\alpha - 2.72$, may be used as a rough estimate. Maximum expected errors based on published (for V) and measurement/calibration (for $H\alpha$) are shown.

tation and/or non-radial pulsations (see Porter & Rivinius, 2003). These mechanisms, individually or in combination are usually proposed to explain disc formation and outbursts in Be stars. Sudden brightening and fading episodes are thought to be connected with discrete mass ejection at the surface of Be and B[e] stars. The most notable variations are time dependent variations, known as E/C variations (Hubert-Delplace et al. 1982) where there may be either a change in the emission line intensity or in the continuum level. The latter occasionally cause a veiling effect in the intensity of early-type Be stars.

The jury is still out regarding the mechanism that triggers short-period line profile variability. The possibility of non-radial pulsations has been proposed by several authors (see Rivinius et al. 2003). If the modeling codes (see Townsend, 1997) are observationally confirmed, up to 80% of early-type Be stars may pulsate in one or more modes. Large numbers of spectroscopic observations to detect multi-periodicity will help to decide this issue. Lastly, and related, are the time variations in the intensities of violet and red components (V/R) as seen in double-peaked emission-line profiles. These probably arise from one-armed density waves in the circumstellar disk.

The classification of Be stars in terms of their light curves was initiated by Mennickent et al. (2002) based on their discovery of 1056 Be star candidates in the Small Magellanic Cloud (SMC) using OGLE II data. Having observed

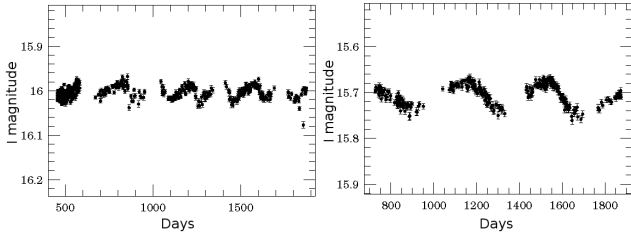


Figure 33. Light curves for RPs1383 (B0Ve, H α : Single Peak, $v \sin i$: $243 \pm 12 \text{ km s}^{-1}$) and RPs1794 (B2V[e], H α : Single Peak, $v \sin i$: $185 \pm 9 \text{ km s}^{-1}$) from the OGLE-II database. These examples show regular variability, with a steady central magnitude.

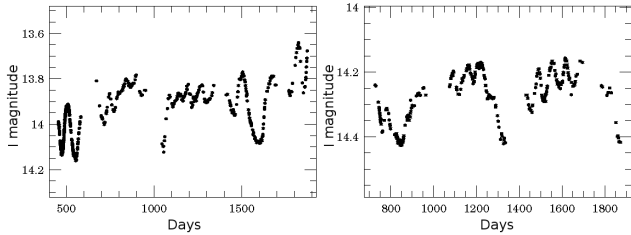


Figure 34. Light curves for RPs870 (B2IV[e], H α : Double Peak R>V, $v \sin i$: $245 \pm 12 \text{ km s}^{-1}$) and RPs2197 (H α : Double Peak R>V, $v \sin i$: $82 \pm 4 \text{ km s}^{-1}$) from the OGLE-II database. These examples show semi-regular variability interspersed with minor variations.

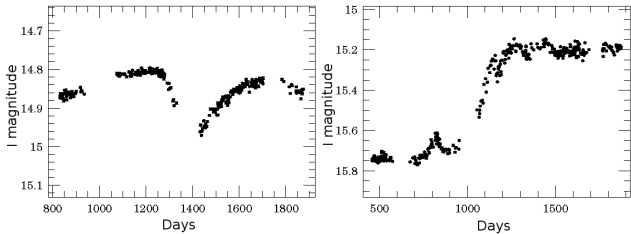


Figure 35. Light curves for RPs1173 (B1IIe, H α : Single Peak, $v \sin i$: $356 \pm 18 \text{ km s}^{-1}$) and RPs1382 (B1Ve, H α : Double Peak V>R, $v \sin i$: $319 \pm 16 \text{ km s}^{-1}$) from the OGLE-II database. These examples are long period variables which may also include micro features such as that seen at period 1200 days in the right image.

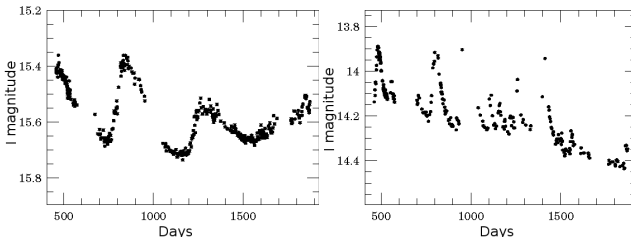


Figure 36. Light curves for RPs1381 (B1Ve, H α : Single Peak, $v \sin i$: $184 \pm 9 \text{ km s}^{-1}$) and RPs1348 (B1IIe, H α : Single Peak, $v \sin i$: $133 \pm 79 \text{ km s}^{-1}$) from the OGLE-II database. RPs1381 shows quasi non-regular periods where the brightening can be quite sudden at times. RPs1348 shows semi-regular variability on a broad decline over a long period.

several light curves not seen in Galactic Be stars, they classified four types. Type-1 show outbursts; Type-2 show sudden high and low oscillations; Type-3 show periodic or near periodic variations; Type-4 show the type of light curves seen in Galactic Be stars.

In our data, variability is usually easy to detect by comparing an image taken at a single epoch with our 12 stacked and combined images taken over a 3 year period. While this method strongly indicates variability, the length of the periods can only be measured with repeat exposures over regular intervals.

Although the OGLE photometry currently available does not cover the outer regions of the LMC, there is sufficient data available to find variable stellar candidates within the inner bar region of the LMC. A careful search has found 117 stars with OGLE II data available from our selection of Be stars in the area. Some representative examples of the light curves from these stars are shown in Figures 33 to 36. Periods vary between a few days and over 2,000 days. Magnitude variations range from 0.05 mag (Figure 33 left) to 0.6 mag (Figure 33 right). Many stars show inconsistent variations in both magnitude and period. For example, Figure 34 left shows several 100 day periods followed by a general 0.2 mag increase. The brighter magnitude is accompanied by short bursts which broaden out and increase to 0.3 magnitudes after 900 days. The light curve of RPs1382 (Figure 35 right) shows a short 0.15 mag burst after 400 days (from the start of observations) which precedes and may possibly have pre-cursed a large 0.5 mag increase which was maintained for at least 700 days to the end of the observations. Examples not shown here also include long-term fading episodes such as large decreases over 0.5 in magnitude followed by a wave of short period bursts.

For our LMC data, the larger magnitude variability (>0.2 mag) is mainly confined to early spectral type Be stars (brighter than $\sim B4$). These variations include regular, semi-regular and sporadic outbursts in stars with moderate to high $v \sin i$. Short and mid-term variability on scales of days to weeks can produce amplitudes of up to 0.3 mag. Long-term variability (years to decades) can be accompanied by amplitudes up to 0.8 mag. It is noteworthy that the 2 long period examples with major fading and brightening events shown in Figure 35 have high rotational velocities which are among the highest 20% of $v \sin i$ measurements in our sample.

Figure 36 left shows RPs1381, an example of a Be star which features recurrent outbursts (100 days) which slowly decrease over much longer periods, typically about 400 days in this example. Each outburst has a decreasing amplitude which culminates in a gradual brightening after at least 1000 days.

An interesting phenomenon observed in some variable stars is multiple period oscillations. Low amplitude oscillations are superimposed on much slower and often irregular periods. For example, we find ~ 100 day luminosity bursts or minor periods occurring as stars experience an overall decrease in magnitude lasting in excess of 2000 days (Figure 36 right). The variability of emission-line stars is now recognised as one of the main Be star diagnostics; hence further spectroscopic follow-up has been planned.

15 THE CATALOGUE OF EMISSION-LINE STARS

The full catalogue of emission-line stars uncovered in the stacked $H\alpha$ survey of the central 25deg^2 of the LMC is provided in the Appendix as Tables 1 and 2. In Table 1 we present our measured and derived data whereas in Table 2 we present a compendium of catalogue identifications and magnitudes where available for each star.

In the first column of Table 1 we give the Reid & Parker (RPs) catalogue number where the ‘s’ is added to clearly identify and separate stars from other objects such as PNe, SNRs and $H\text{II}$ regions which included in the larger RP catalogue. Columns 2 and 3 give the accurate RA and Dec in J2000 world coordinates to 2 decimal places in RA and 1 decimal place in DEC with reference to SuperCOSMOS and verified against 2MASS astrometry. Column 4 provides a published catalogue reference where a star has been previously identified. Please note that this reference does not necessarily indicate that the star was known as an emission-line star. Column 5 shows our estimate of spectral classification and luminosity class as derived from the cross-correlation described in section 6.1.

Column 6 gives the emission flux from $H\alpha\lambda 6563$ which was measured from our flux-calibrated spectra. All measurements of the $H\alpha$ line including the flux, FWHM (column 7) and the EW (column 8) were measured using the highest quality, medium to high resolution spectra ($R > 1,000$) available in our data set. Individual measurements were made using standard IRAF tasks. The heliocentric velocity shown in column 9 represents the measurement which produced the lowest errors, obtained from our high resolution spectra using the IRAF (EMSAO and XCSAO) tasks. Details are provided in section 10. The estimated rotational velocity ($v \sin i$) is shown in column 10 and described in section 7.

In column 11 we provide comments on each star including a list of which H lines were observed in emission. In the majority of cases, forbidden lines indicate that the star is a B[e] type, however, in several cases, the presence of both low $[S\text{II}]$ emission and ambient $H\alpha$ emission (detected in our $H\alpha$ stacked image) suggest that these forbidden lines are not intrinsic to the star itself. In such cases we present the star as a normal Be star but comment on the low $[S\text{II}]$ found in the spectrum. Standard abbreviations include ‘SP’ and ‘DP’ indicating an $H\alpha$ line with a single peak or a double peak respectively. The ‘DP’ abbreviation is usually followed by either ‘V>R’, ‘R>V’, or ‘centre’ indicating the position of the absorption feature (see section 6.4).

The second table presented in the appendix contains a compilation of the B, V, I and R photometry available for each object in this work. In the first three columns we again provide the RP number, RA and DEC of each object to make identification and cross-referencing easier. The fourth column lists the GSC2.2 catalog reference number while column 5 gives the linear distance in arcmins between our position and the GSC2.2 position. Positional errors at the plate epoch are estimated to be in the 200-250 mas range. Column 6 gives the OGLE catalog reference where the matching position has been found in the OGLE II database. Column 7 gives the USNO-A2.0 catalog reference with the linear distance in arcmins between our position and the best matching USNO position shown in column 8. It is estimated that the

positional error at plate epoch is near 250 mas. Column 9 then provides the position angle (PA) for each object published in the USNO catalog.

The remaining columns, 10 to 18 provide the magnitudes where available for each star. Since emission-line stars are variable, we should expect a comparison of surveys to reveal minor variations in overall flux estimates. These modulations are confirmed by the data presented here.

In columns 10 to 12 we present the B magnitudes from OGLE, SuperCosmos (SC) and USNO respectively. Columns 13 and 14 give the V magnitudes from GSC2.2 and OGLE. Columns 15 and 16 give the I magnitudes from SC and OGLE and columns 17 and 18 give the R magnitudes from SC and USNO.

Our online database to be hosted at Macquarie University will contain extra information relating to each star. We will provide optical spectra for each object as well as 1×1 arcmin $H\alpha$ /Short Red thumbnail images. At the time of writing, the web site is under construction.

16 SUMMARY

Using our deep $H\alpha$ and SR maps centered on the central 25deg^2 of the LMC, we have uncovered 1,003 stars which exhibit $H\alpha$ emission. A series of follow-up spectroscopic observations were performed, mostly using 2dF on the AAT during December 2004. The majority of the stars have been assigned a spectral classification using the IRAF cross-correlation technique and spectral class templates. In addition to the 111 previously known Be stars we have added 468 newly discovered Be, B[e], A and F stars. Most of these stars fall between spectral classes B1 and B3. Analysis of the survey data has also allowed us to identify 315 M (late-type) stars exhibiting chromospheric emission.

For the hot emission-line stars, we provide new, accurate positions, radial and rotational velocities. The distribution of radial velocities has been plotted and compared to the heliocentric distributions for PNe and the $H\text{I}$ gas disk in the LMC. The good agreement not only indicates that all our emission-line star candidates are located in the LMC, but traces the overall inclination of the LMC’s main disk. The distribution of rotational velocities has been plotted and compared to a Galactic sample, revealing a 200-300 km s^{-1} agreement in the peak of the distributions. We have also briefly discussed the various $H\alpha$ emission-line profiles identified in our LMC sample.

Emission from the hot B to F stars has been measured and flux calibrated in order to provide the first ever luminosity function for the $H\alpha$ emission from these stars. This included the first ever derived conversion from $H\alpha$ fluxes to magnitudes, with its associated formula, which can be used generally for emission objects in the LMC. The emission has a bright cut-off at magnitude 14.8 (absolute -4.5) and covers a 9 magnitude range. The function shows a steady rise to a distribution peak at 18.5 followed by a decrease over 5 magnitudes to magnitude 23.6. We find a mild correlation between the $H\alpha$ and V magnitudes of the hot stars in our sample. Main sequence stars in our sample are only found at magnitudes below 14.5 in V whereas giants extend to magnitude 12 in V. A compilation of B,V,I and R magnitudes

from OGLE II, SuperCOSMOS, ESO GSC 2.2 and USNO are provided in Table 2 of the Appendix.

A plot of the distribution of emission-line stars within the survey area shows that approximately 40% lie on the main bar. As many as 130 (25%) of the B-class stars are found to be of the B[e] variety, emitting forbidden lines in [S II], [N II], [O I] and even [O III]. Many of these are located in areas of strong ambient emission or H II regions so care is needed to removed these contributions if only emission associated with or emitting from the star is to be measured. These stars with probable contamination have been labeled accordingly within the tables.

17 ACKNOWLEDGEMENTS

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1 APPENDIX: TABLE 1

Basic data for all hot emission-line stars in the LMC UKST H α survey. Please refer to section 15 for more detailed information. Column 1 gives the Reid Parker (RPs) number for the star (s). Columns 2 and 3 give the RA and Dec in J2000 coordinates. Column 4 gives the published catalogue and number where a star has been previously identified. Column 5 gives our estimate of spectral classification and luminosity class. Column 6 gives a log of the H α emission flux obtained from our flux calibrated spectra. Column 7 gives the Full Width at Half Maximum (FWHM) in km/s as measured from our data. Column 8 gives the Equivalent Width (EW) of the H α line in Angstroms. Column 9 gives the heliocentric radial velocity and column 10 gives the rotational velocity ($v \sin i$). In column 11 we provide comments where em=emission, A.Em=ambient emission, SP=single peak, DP=double peak, sh=shell. Notes on column 4 are given at the end of the table.

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
RPs1741	04 52 55.41	-70 42 12.3		B7Ve	-13.92	464 \pm 23	70 \pm 3	326 \pm 6	449 \pm 22	H α , β
RPs1647	04 53 01.03	-70 42 12.3		B3Ve	-13.97	342 \pm 17	18 \pm 1	241 \pm 1	243 \pm 12	H α , [S II] from faint, diffuse local emission
RPs1701	04 53 02.01	-69 47 04.1		B2Ve	-13.73	333 \pm 17	55 \pm 2	236 \pm 5	296 \pm 15	H α , β
RPs1699	04 53 06.86	-69 57 24.7		B1.7V[e]	-13.33	56 \pm 3	59 \pm 2	242 \pm 1	22 \pm 1	H α , β , γ , [S II], [N II], [O II]
RPs1671	04 53 25.43	-70 35 39.7		B0III[e]	-12.78	247 \pm 12	19 \pm 1	262 \pm 1	165 \pm 8	H α , β , γ , [S II], [N II], [O III]
RPs1778	04 53 43.26	-69 54 02.3		B2Ve	-13.18	282 \pm 14	74 \pm 3	271 \pm 4	267 \pm 13	H α , β
RPs1715	04 53 54.12	-69 29 24.9		B1.5Ve	-13.64	349 \pm 17	48 \pm 2	260 \pm 4	304 \pm 15	H α , β
RPs1704	04 54 06.45	-69 41 14.9		B1Ve	-13.36	362 \pm 18	77 \pm 3	261 \pm 5	352 \pm 18	H α , β
RPs1844	04 54 08.72	-68 37 02.9		B3IIIe	-12.88	307 \pm 15	61 \pm 2	289 \pm 4	278 \pm 14	H α , β
RPs1757	04 54 11.97	-69 00 53.9	BE74162	B1Ve	-13.29	357 \pm 18	89 \pm 4	275 \pm 5	356 \pm 18	H α , β
RPs1814	04 54 12.32	-68 45 21.0		B2Ve	-13.84	345 \pm 17	44 \pm 2	253 \pm 5	300 \pm 15	H α , β
RPs1700	04 54 23.92	-69 50 53.2		B1Ve	-13.20	336 \pm 17	56 \pm 2	238 \pm 5	299 \pm 15	H α , β
RPs1767	04 54 26.05	-68 54 38.1		B3Ve	-13.36	260 \pm 13	30 \pm 1	286 \pm 4	199 \pm 10	H α , Pcyg. Profile on H β
RPs1765	04 54 30.18	-68 55 25.2		B2Ve	-13.49	317 \pm 16	40 \pm 2	302 \pm 5	264 \pm 13	H α , β
RPs1783	04 54 33.88	-69 20 35.7	L6331	B2III[e]	-12.40	129 \pm 6	113 \pm 5	240 \pm 3	116 \pm 6	H α , β , γ , δ , multiple forbidden lines. Few absorption lines. Weak correlation.
RPs1766	04 54 37.11	-68 55 19.4		B2Ve	-13.62	250 \pm 12	42 \pm 2	280 \pm 12	201 \pm 10	H α , β
RPs1784	04 54 53.95	-69 23 23.7		B0Ve	-13.08	100 \pm 5	69 \pm 3	277 \pm 23	70 \pm 4	H α , β , in area of strong H α emission 20 x 16 arcsec with filament to NE
RPs1651	04 54 54.76	-70 33 41.4		B2IIIe	-12.87	325 \pm 16	78 \pm 3	233 \pm 5	313 \pm 16	H α , β , γ
RPs1781	04 55 27.18	-69 29 33.1		B2Ve	-13.07	175 \pm 9	41 \pm 2	254 \pm 3	130 \pm 7	H α , β
RPs1786	04 55 28.71	-69 21 36.5		B3IIIe	-12.57	283 \pm 14	68 \pm 3	253 \pm 4	260 \pm 13	H α , β
RPs1780	04 55 33.97	-69 29 43.5		B2IIIe	-12.58	343 \pm 17	49 \pm 2	267 \pm 5	298 \pm 15	H α , β
RPs1710	04 55 39.89	-69 34 09.0	L6339	B3III	-12.76	336 \pm 17	45 \pm 2	255 \pm 4	291 \pm 15	H α , β , patchy emission in local area
RPs1843	04 55 44.36	-68 35 42.9		B1III[e]	-12.91	57 \pm 3	80 \pm 3	275 \pm 2	27 \pm 1	H α , β , [S II], [N II], centre of complex, dense stellar cluster 19 arcsec dia with strong H α emission surrounding all.
RPs1779	04 55 58.23	-69 28 18.3	MACHO17.2472.36	B1III[e]	-13.02	192 \pm 10	25 \pm 1	261 \pm 3	128 \pm 6	H α , β , faint and diffuse emission in area contributes [S II], [N II], [O II] and [O III] at low levels.
RPs1829	04 55 59.94	-68 42 08.8		B2IVe	-13.97	260 \pm 13	43 \pm 2	308 \pm 4	211 \pm 11	H α , β
RPs1703	04 56 01.98	-69 43 22.8	MACHO17.2468.63	B1Ve	-13.10	300 \pm 15	56 \pm 2	253 \pm 4	271 \pm 14	H α , β
RPs1733	04 56 14.22	-69 21 29.6		B3IIIe	-12.80	371 \pm 19	100 \pm 4	274 \pm 5	382 \pm 19	H α , β
RPs1857	04 56 14.37	-68 22 59.3		B3IIIe	-12.86	322 \pm 16	56 \pm 2	282 \pm 5	293 \pm 15	H α , β
RPs1828	04 56 23.14	-68 41 34.4		B5IIIe	-13.81	288 \pm 14	49 \pm 2	311 \pm 4	244 \pm 12	H α , (Pcyg profile on H β)
RPs1782	04 56 23.42	-69 24 41.5		B2IV[e]	-13.18	56 \pm 3	175 \pm 7	253 \pm 1	41 \pm 2	H α , β , γ , δ , ϵ , [S II], [N II], [O II], [O III]
RPs1736	04 56 37.52	-69 16 08.5		B1Ve	-13.28	351 \pm 18	44 \pm 2	242 \pm 5	306 \pm 15	H α , β
RPs1732	04 56 44.68	-69 20 53.4		A5Ve	-13.72	147 \pm 7	32 \pm 1	253 \pm 3	96 \pm 5	H α , β
RPs1762	04 56 54.26	-68 55 54.6		F8Ve	-13.48	237 \pm 12	24 \pm 1	291 \pm 4	167 \pm 8	H β line suffers from low S/N
RPs1928	04 57 26.91	-66 44 08.7		B3V[e]	-14.49	307 \pm 15	83 \pm 3	304 \pm 40	302 \pm 15	H α , β , [S II], [N II], [O II], [O III], emission to East, star to West
RPs1746	04 57 48.54	-69 04 15.6		B3Ve	-13.91	329 \pm 16	43 \pm 2	276 \pm 3	276 \pm 14	H α , β , ([S II] at 2 σ noise)
RPs1884	04 58 07.26	-67 41 11.4		B0.5II[e]	-12.26	100 \pm 5	125 \pm 5	301 \pm 21	86 \pm 4	H α , β , γ , [S II], [N II], [O II], [O III]
RPs1737	04 58 17.48	-69 17 20.1		B1.7Ve	-13.68	333 \pm 17	48 \pm 2	288 \pm 4	288 \pm 14	H α , β
RPs1806	04 58 33.31	-68 50 49.9	HD268840	B0.5III[e]	-11.69	286 \pm 14	71 \pm 3	279 \pm 4	264 \pm 13	H α , β , γ , δ , ϵ , [S II], [N II], [O II], [O III]
RPs1826	04 58 38.12	-68 42 26.5		B2IV[e]	-13.32	441 \pm 22	45 \pm 2	299 \pm 9	393 \pm 20	H α , β , [O III]
RPs1804	04 58 55.65	-68 51 45.1		B3IIIe	-12.84	408 \pm 20	36 \pm 1	284 \pm 6	342 \pm 17	H α , β
RPs1747	04 58 56.23	-69 03 29.1		F8II[e]	-12.65	212 \pm 11	76 \pm 3	294 \pm 3	193 \pm 10	H α , β , γ , δ , low [O III], HeII 4686, [S II], [N II]
RPs1839	04 58 56.52	-68 35 02.8	MACHO18.3090.104	B5IIIe	-12.76	188 \pm 9	50 \pm 2	262 \pm 3	151 \pm 8	H α , β , Could appear as a B8 I star
RPs1860	04 58 58.47	-70 20 32.8		B3IIIe	-13.33	266 \pm 13	72 \pm 3	245 \pm 4	250 \pm 13	H α , β
RPs1774	04 59 35.00	-70 06 59.0		B1V[e]	-13.25	339 \pm 17	33 \pm 1	231 \pm 1	270 \pm 14	H α , Pcyg on H β , [S II], [N II], [O II]. East star of double system
RPs1775	04 59 37.18	-70 09 09.6	BE74499	B0.5III[e]	-12.59	49 \pm 2	109 \pm 4	235 \pm 1	24 \pm 1	H α , β , γ , δ , [S II], [N II], [O II], dense H II disk extending to 2 smaller stars to the SE
RPs1717	04 59 44.89	-69 28 57.2		B0Ve	-13.13	309 \pm 15	32 \pm 1	259 \pm 4	243 \pm 12	H α , β
RPs1724	04 59 44.90	-69 25 32.5		B3Ve	-13.06	229 \pm 11	68 \pm 3	261 \pm 3	204 \pm 10	H α , β

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
RP s1656	04 59 46.62	-70 25 27.7		B1Ve	-13.74	509 \pm 25	60 \pm 2	278 \pm 9	483 \pm 24	H α only, Pcyg on H β
RP s1698	04 59 48.42	-69 54 13.0	L6370	B1Ve	-12.99	290 \pm 14	78 \pm 3	226 \pm 4	276 \pm 14	H α, β
RP s1856	04 59 54.75	-68 23 07.4		B0.5IIIe	-13.16	410 \pm 20	50 \pm 2	289 \pm 6	373 \pm 19	H α, β, γ
RP s1777	05 00 13.12	-70 02 56.5	SVDV 284	B1.5Ve	-13.56	291 \pm 15	79 \pm 3	246 \pm 4	277 \pm 14	H α, β
RP s1722	05 00 14.06	-69 25 13.9	SAB2338	B2Ve	-13.01	309 \pm 15	61 \pm 2	250 \pm 4	280 \pm 14	H α, β
RP s1855	05 00 28.46	-68 23 04.4		B2Ve	-13.56	547 \pm 27	41 \pm 2	274 \pm 9	483 \pm 24	H α, β
RP s1755	05 00 28.77	-69 01 06.3	SAB1539	B3Ve	-13.23	323 \pm 16	77 \pm 3	277 \pm 5	310 \pm 16	H α, β
RP s1729	05 00 35.39	-69 19 53.3	SAB744	B3IIIe	-13.16	272 \pm 14	50 \pm 2	272 \pm 4	235 \pm 12	H α, β
RP s1662	05 01 32.53	-70 16 56.1	MACHO23.3428.997	B1Ve	-13.28	477 \pm 24	54 \pm 2	251 \pm 6	439 \pm 22	H α, β
RP s1707	05 01 33.25	-69 36 58.7		B1Ve	-12.79	353 \pm 18	106 \pm 4	274 \pm 5	372 \pm 19	H α, β
RP s1832	05 01 48.92	-68 37 33.6	SAB1625	B3IIIe	-13.00	347 \pm 17	56 \pm 2	238 \pm 5	319 \pm 16	H α, β, γ
RP s1663	05 01 50.52	-70 16 14.9		B2Ve	-13.65	363 \pm 18	66 \pm 3	261 \pm 4	344 \pm 17	H α, β
RP s1645	05 02 00.95	-70 42 23.7	BE74504	B1V[e]	-12.70	90 \pm 5	106 \pm 4	254 \pm 2	71 \pm 4	H α, β , [S II], [N II], [O II] (emission lines brighter than continuum).
RP s1792	05 02 03.12	-69 03 40.9	SAB1656	B0V[e]	-13.28	247 \pm 12	43 \pm 2	271 \pm 3	198 \pm 10	H α, β , [S II], [N II], [O II]
RP s1838	05 02 26.96	-68 36 55.8	AL56	BIIIpe	-12.09	281 \pm 14	86 \pm 3	292 \pm 4	274 \pm 14	H α, β equal to a B2IIIe
RP s1854	05 02 39.99	-68 27 59.4		B1.7V[e]	-12.70	56 \pm 3	140 \pm 6	286 \pm 2	37 \pm 2	H α, β, γ , [S II], [N II], [O II], within a small assoc. of stars.
RP s1750	05 02 45.65	-69 03 13.1		B1V[e]	-13.65	77 \pm 4	18 \pm 1	287 \pm 2	23 \pm 1	H α, β , [S II], [N II]
RP s1745	05 02 50.69	-69 07 57.6	SAB236	B1.7Ve	-14.30	95 \pm 5	11 \pm 0	285 \pm 2	29 \pm 1	H α , (H β with strong Pcyg profile.) Forbidden lines and 40% H α due to diffuse emission 20 arcsec diameter stretching NE-SW
RP s1834	05 03 04.89	-68 38 35.6		B3Ve	-13.96	234 \pm 12	44 \pm 2	274 \pm 3	191 \pm 10	H α , (Pcyg profile on H β)
RP s1850	05 03 26.01	-68 28 24.3		F0IVe	-13.80	471 \pm 24	146 \pm 6	199 \pm 12	533 \pm 27	H α, β , weak continuum
RP s1852	05 03 32.09	-68 27 56.1		B1Ve	-14.23	315 \pm 16	33 \pm 1	285 \pm 15	249 \pm 12	H α, β , ([S II] appears to be assoc. with emission to NW)
RP s1845	05 03 32.94	-68 32 35.0		B1Ve	-14.62	296 \pm 15	5 \pm 0	272 \pm 1	146 \pm 7	H α only. Centre of faint, extended H II emission 12 x 12 arcsec.
RP s1794	05 03 38.63	-69 01 21.2	SAB839	B2V[e]	-13.17	239 \pm 12	37 \pm 1	278 \pm 3	185 \pm 9	H α, β , [S II], [N II], [O III], SP
RP s1793	05 03 38.94	-69 01 11.9		B1Ve	-13.76	203 \pm 10	29 \pm 1	283 \pm 1	142 \pm 7	H α , pcyg profile on H β , [S II] from local diffuse nebula
RP s1851	05 03 39.12	-68 28 23.7		B1Ve	-14.40	291 \pm 15	5 \pm 0	286 \pm 1	143 \pm 7	H α , [S II] at only 3 σ noise
RP s1614	05 03 41.74	-71 07 09.7		A7Ve	-14.36	198 \pm 10	46 \pm 2	235 \pm 2	156 \pm 8	H α
RP s1760	05 03 51.47	-68 57 25.3	BE74193	B1IIIe	-13.42	733 \pm 37	17 \pm 1	233 \pm 24	553 \pm 28	H α, β, γ , [S II]
RP s1899	05 03 52.12	-67 32 43.6		A0Ve	-13.45	207 \pm 10	61 \pm 2	282 \pm 15	176 \pm 9	H α, β
RP s1945	05 04 09.07	-67 18 30.1		B2IIIe	-12.58	424 \pm 21	32 \pm 1	308 \pm 6	347 \pm 17	H α, β
RP s1910	05 04 17.16	-67 10 55.4		B0IIIe	-13.69	192 \pm 10	38 \pm 2	290 \pm 6	142 \pm 7	H α, β , [S II]
RP s1909	05 04 18.26	-67 10 30.3		B3IIIe	-13.59	97 \pm 5	20 \pm 1	297 \pm 17	41 \pm 2	H α , [S II]
RP s1944	05 04 24.06	-67 19 45.9		B2V[e]	-13.43	259 \pm 13	73 \pm 3	306 \pm 23	243 \pm 12	H α, β, γ , [S II], [N II], [O II], [O III]
RP s1738	05 04 31.78	-69 17 40.9		B8Ve	-14.19	382 \pm 19	22 \pm 1	286 \pm 5	285 \pm 14	H α
RP s1817	05 04 35.61	-68 44 55.1	AL66	F0Ie	-11.84	165 \pm 8	40 \pm 2	253 \pm 3	120 \pm 6	pcyg on H α, β , central star of a compact cluster 20arcsec dia.
RP s1881	05 04 37.15	-67 49 49.0		B3IIIe	-13.86	97 \pm 5	7 \pm 0	284 \pm 2	24 \pm 1	H α , 3 stars in a row. All bright in H α
RP s1751	05 04 37.41	-69 05 05.7		B3IIIp[e]	-13.55	94 \pm 5	22 \pm 1	290 \pm 2	40 \pm 2	H α, β , [S II], [N II], [O III] possible Bp, sh
RP s1923	05 04 40.40	-66 49 49.0		B1IIIe	-13.77	187 \pm 9	23 \pm 1	312 \pm 14	124 \pm 6	H α, β
RP s1672	05 04 40.78	-70 42 06.0		B1.7Ve	-13.09	335 \pm 17	56 \pm 2	240 \pm 5	306 \pm 15	H α, β
RP s1863	05 04 44.02	-68 16 32.4		A0Ve	-13.73	181 \pm 9	8 \pm 0	264 \pm 2	85 \pm 4	H α, β , faint diffuse H II emission surrounding star
RP s1795	05 04 44.85	-68 58 31.1	L63106	B2IIIe	-12.47	205 \pm 10	47 \pm 2	290 \pm 3	163 \pm 8	H α, β
RP s1936	05 04 47.97	-66 38 53.2			-13.91	445 \pm 22	134 \pm 5	302 \pm 13	489 \pm 25	H α, β , very weak
RP s1935	05 04 51.70	-66 38 07.6		B0.5IIIe	-12.32	360 \pm 18	140 \pm 6	315 \pm 18	401 \pm 20	H α, β, γ , southern-most of 7 stars in a line
RP s1675	05 04 54.94	-70 43 33.7		B3IIIe	-12.39	330 \pm 16	46 \pm 2	275 \pm 8	285 \pm 14	H α, β
RP s1650	05 04 56.74	-70 34 45.9	L63114	B1.7Ve	-13.83	288 \pm 14	35 \pm 1	250 \pm 4	230 \pm 12	H α, β
RP s1640	05 04 58.05	-70 41 03.0	BE74519	B1.7Ve	-13.36	335 \pm 17	27 \pm 1	256 \pm 4	259 \pm 13	H α, β
RP s1901	05 04 58.48	-67 32 05.2		B2Ve	-13.35	231 \pm 12	69 \pm 3	360 \pm 11	207 \pm 10	H α, β
RP s1639	05 05 00.69	-70 41 03.4	MACHO23.3906.30	B3Ve	-13.25	379 \pm 19	170 \pm 7	243 \pm 8	434 \pm 22	H α, β
RP s1818	05 05 04.09	-68 44 40.4	2MASSJ05050415-6844407	B4IVe	-12.77	335 \pm 17	101 \pm 4	242 \pm 5	342 \pm 17	H α, β , Previously identified as delta Cepheid variable
RP s1820	05 05 22.28	-68 43 39.5		B5IIIe	-13.06	188 \pm 9	101 \pm 4	285 \pm 3	177 \pm 9	H α, β
RP s1629	05 05 25.31	-70 51 53.8		B0Ve	-13.77	298 \pm 15	104 \pm 4	255 \pm 9	301 \pm 15	H α, β
RP s1641	05 05 26.53	-70 39 45.2	MACHO23.4027.43							Not observed
RP s1642	05 05 30.41	-70 40 22.0		B1Ve	-13.72	395 \pm 20	62 \pm 2	246 \pm 5	368 \pm 18	H α, β
RP s1926	05 05 33.48	-66 51 17.9		A0Ve	-13.19	303 \pm 15	156 \pm 6	324 \pm 16	341 \pm 17	H α, β
RP s1821	05 05 39.09	-68 43 20.2	SAB561	B5IIIe	-13.16	229 \pm 11	35 \pm 1	243 \pm 4	176 \pm 9	H α, β
RP s1861	05 05 56.94	-68 20 03.2		A2IIIe	-13.04	270 \pm 14	48 \pm 2	307 \pm 4	227 \pm 11	H α, β , molecular absorption
RP s1915	05 06 08.53	-67 01 23.1		B3IIIe	-13.41	286 \pm 14	48 \pm 2	272 \pm 3	242 \pm 12	H α, β
RP s1882	05 06 26.66	-67 42 58.3		B0.5IIIe	-12.94	392 \pm 20	50 \pm 2	282 \pm 6	355 \pm 18	H α, β

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
RPs1822	05 06 38.01	-68 44 41.5		B1.7V[e]	-13.71	167 \pm 8	27 \pm 1	272 \pm 1	111 \pm 6	H α , β , γ , [S II], [N II], [O II], [O III]. Dense halo surrounding star + diffuse emission 10 arcsec radius surrounding assoc. of stars.
RPs1822	05 06 38.01	-68 44 41.5		B1.7V[e]	-13.71	167 \pm 8	27 \pm 1	272 \pm 1	111 \pm 6	H α , β , γ , [S II], [N II], [O II], [O III]. Dense halo surrounding star + diffuse emission 10 arcsec radius surrounding assoc. of stars.
RPs1754	05 06 39.31	-69 01 22.5		B1Ve	-13.54	457 \pm 23	48 \pm 2	268 \pm 3	408 \pm 20	H α , β , [S II] only 3 sigma noise
RPs1879	05 06 50.97	-67 46 53.7		B1Ve	-13.94	253 \pm 13	138 \pm 6	247 \pm 4	272 \pm 14	H α , β
RPs1865	05 06 54.00	-68 16 08.9			-14.22	135 \pm 7	36 \pm 1	284 \pm 1	88 \pm 4	Too faint to determine accurate class.
RPs1847	05 06 59.17	-68 31 56.5		B3IIIe	-13.99	319 \pm 16	5 \pm 0	255 \pm 1	161 \pm 8	H α only
RPs1811	05 07 01.08	-68 46 60.0		B3V[e]	-14.05	94 \pm 5	23 \pm 1	270 \pm 1	41 \pm 2	H α , β , [S II], [N II]
RPs1837	05 07 11.00	-68 36 31.8		B5IIIe	-12.89	174 \pm 9	22 \pm 1	295 \pm 1	109 \pm 5	H α , β
RPs1744	05 07 11.44	-69 10 50.0	SAB15	A7Ve	-14.60	200 \pm 10	35 \pm 1	271 \pm 2	149 \pm 7	H α , β , weak forbidden lines due to compact diffuse emission to SW
RPs1914	05 07 11.54	-67 02 23.0	BE7418	B0.5IIIe	-12.88	346 \pm 17	48 \pm 2	318 \pm 5	301 \pm 15	H α , β
RPs1836	05 07 16.78	-68 39 06.6		B5IIIe	-13.09	339 \pm 17	61 \pm 2	244 \pm 5	310 \pm 16	H α , β
RPs1262	05 07 26.42	-69 59 41.5	SAB1596	B1Ve	-13.19	224 \pm 11	60 \pm 2	244 \pm 3	193 \pm 10	H α , β
RPs1302	05 07 41.85	-69 22 30.3		B1IIIe	-12.83	235 \pm 12	49 \pm 2	246 \pm 4	199 \pm 10	H α , β
RPs1132	05 07 44.47	-71 23 53.6		B7Ve	-12.49	357 \pm 18	53 \pm 2	221 \pm 5	320 \pm 16	H α , β
RPs1862	05 07 47.09	-68 18 59.6		B2V[e]	-14.45	78 \pm 4	8 \pm 0	255 \pm 1	12 \pm 1	H α , β , [S II], [N II], [O III], much of emission from H II region extending North
RPs1136	05 08 01.19	-71 21 25.8		B0.5IIIe	-12.23	318 \pm 16	35 \pm 1	206 \pm 5	258 \pm 13	H α , β
RPs1171	05 08 07.04	-70 55 15.9	L63133	B2Ve	-12.20	223 \pm 11	62 \pm 2	213 \pm 3	193 \pm 10	H α , β
RPs1322	05 08 12.63	-68 58 15.0		B1.7V[e]	-13.53	145 \pm 7	39 \pm 2	277 \pm 2	101 \pm 5	H α , β , [S II], [N II], [O II], [O III]
RPs1459	05 08 13.68	-68 36 12.8		B3Ve	-14.99	175 \pm 9	50 \pm 2	251 \pm 1	139 \pm 7	H α only. Possible symbiotic. SP
RPs1501	05 08 29.55	-68 21 09.2		A0Ve	-13.93	168 \pm 8	84 \pm 3	228 \pm 1	151 \pm 8	H α , β
RPs1206	05 08 29.91	-70 20 42.6	MACHO9.4516.29	B3IIIe	-12.82	505 \pm 25	48 \pm 2	234 \pm 7	455 \pm 23	H α , β
RPs1473	05 08 32.37	-68 28 51.7		B1Ve	-14.07	214 \pm 11	55 \pm 2	265 \pm 3	177 \pm 9	H α , β
RPs1393	05 08 33.49	-69 04 48.6		B1.7Ve	-13.92	399 \pm 20	38 \pm 2	263 \pm 6	334 \pm 17	H α , β
RPs1151	05 08 36.12	-71 11 28.1		B3V[e]	-13.50	201 \pm 10	35 \pm 1	221 \pm 3	150 \pm 8	H α , β , [S II], [O III], weak
RPs1299	05 08 38.80	-69 25 34.1	SAB1642	B3V[e]	-13.63	347 \pm 17	17 \pm 1	247 \pm 5	241 \pm 12	H α , [S II], [N II] within H II region and small cluster. Probably contaminated ELS
RPs1298	05 08 41.11	-69 24 44.9		B3V[e]	-14.27	362 \pm 18	38 \pm 2	254 \pm 13	300 \pm 15	H α , β , [S II], [N II]
RPs1483	05 08 52.73	-68 26 29.4		F0Ve	-14.43	316 \pm 16	37 \pm 1	323 \pm 4	257 \pm 13	H α , β
RPs1472	05 09 01.39	-68 32 12.5		B5IIIe	-13.79	57 \pm 3	19 \pm 1	278 \pm 1	7 \pm 0	H α , β , surrounded by a cloud of emission 9arcsec radius
RPs1133	05 09 06.46	-71 21 10.9		B2Ve	-12.58	273 \pm 14	38 \pm 2	217 \pm 5	217 \pm 11	H α , β
RPs1145	05 09 29.88	-71 15 23.1	L63142	B0.5IIIe	-11.96	354 \pm 18	48 \pm 2	248 \pm 5	308 \pm 15	H α , β
RPs1126	05 09 41.93	-71 27 41.5	AL94	B1.7Ve	-12.15	65 \pm 3	65 \pm 3	229 \pm 2	33 \pm 2	H α , β , forbidden lines from dense emission surrounding assoc of 9 stars, cluster.
RPs1531	05 09 44.24	-67 57 50.5		B5III[e]	-13.70	112 \pm 6	16 \pm 1	297 \pm 1	48 \pm 2	H α , β , [S II], [N II]
RPs1326	05 09 47.58	-69 00 31.5		B3Ve	-13.96	279 \pm 14	11 \pm 0	245 \pm 1	164 \pm 8	H α , [S II] from ambient emission
RPs1311	05 09 58.94	-69 10 39.6	MACHO79.4775.100	B5IIIe	-13.56	168 \pm 8	10 \pm 0	256 \pm 2	82 \pm 4	H α , β
RPs1134	05 10 08.37	-71 20 35.5				0	0			Not observed
RPs1471	05 10 12.42	-68 32 31.1		B1Ve	-14.13	218 \pm 11	34 \pm 1	266 \pm 3	160 \pm 8	H α only
RPs1312	05 11 03.97	-69 07 32.6		B2IIIe	-13.02	207 \pm 10	50 \pm 2	268 \pm 3	170 \pm 9	H α , β
RPs1419	05 11 56.00	-68 53 18.6		B1Ve	-13.85	237 \pm 12	41 \pm 2		189 \pm 10	H α only
RPs1290	05 12 07.66	-69 28 35.0	MACHO5.5134.1734	B1IIIe	-13.43	256 \pm 13	41 \pm 2	270 \pm 1	207 \pm 10	H α , β , extended emission contributing [S II] and low [N II]
RPs1209	05 12 08.38	-70 28 40.3		B3IIIe	-12.76	51 \pm 3	35 \pm 1	243 \pm 1	10 \pm 1	H α , β , in an assoc of stars enveloped by a disk of dense H II emission 11 arcsec radius. Cluster
RPs1158	05 12 09.11	-71 06 49.9		B8Ie	-12.22	150 \pm 8	52 \pm 2	287 \pm 3	114 \pm 6	H α , β , γ , possibility of being a B5IIIe
RPs1316	05 12 20.07	-69 04 49.5		F0IIIe	-12.73	527 \pm 26	101 \pm 4	282 \pm 9	556 \pm 28	H α , β , SP
RPs1422	05 12 22.83	-68 52 38.1		B1IIIe	-12.42	307 \pm 15	60 \pm 2	273 \pm 4	278 \pm 14	H α , β
RPs1211	05 12 32.12	-70 29 03.3		B3IIIe	-13.60	90 \pm 5	7 \pm 0	236 \pm 1	17 \pm 1	H α , surrounded by huge emission disk 27 arcsec radius
RPs1205	05 12 36.18	-70 24 58.6		B1Ve	-14.28	102 \pm 5	10 \pm 0	254 \pm 1	32 \pm 2	H α , centre of diffuse emission 6 arcsec radius
RPs1597	05 12 36.69	-66 38 22.5		B5IIIe	-12.50	151 \pm 8	118 \pm 5	255 \pm 6	141 \pm 7	H α , β , γ
RPs1392	05 12 47.90	-69 03 06.4	BE74224	B5IIIe	-12.47	220 \pm 11	53 \pm 2	335 \pm 3	183 \pm 9	H α , β
RPs1461	05 12 49.60	-68 33 55.6		B1.7Ve	-13.47	275 \pm 14	56 \pm 2	240 \pm 3	245 \pm 12	H α , β
RPs1389	05 13 17.44	-69 19 55.0		B3IVe	-12.73	362 \pm 18	131 \pm 5	235 \pm 1	392 \pm 20	H α , β in H II region forbidden lines from H II
RPs1348	05 14 13.05	-69 33 24.6	SAB82	B1IIIe	-12.83	209 \pm 10	19 \pm 1	239 \pm 3	133 \pm 7	H α , β , γ , SP
RPs1350	05 14 14.90	-69 36 08.7		B1Ve	-12.97	239 \pm 12	111 \pm 4	294 \pm 6	242 \pm 12	H α , β , within a compact, dense H II region 13 x 9 arcsec, SP
RPs1499	05 14 29.85	-68 20 50.9		B2IIIe	-13.02	348 \pm 17	67 \pm 3	263 \pm 5	329 \pm 16	H α , β
RPs1470	05 14 32.47	-68 32 46.9		A2Ve	-14.20	213 \pm 11	21 \pm 1	293 \pm 2	142 \pm 7	H α only
RPs1574	05 14 43.41	-67 12 25.3		B3IIIe	-13.64	316 \pm 16	21 \pm 1	309 \pm 1	229 \pm 11	H α , β , Large H II disk 12 arcsec radius surrounding star and contributing [S II].
RPs1563	05 15 09.95	-67 32 15.3		B1Ve	-13.19	206 \pm 10	149 \pm 6	251 \pm 3	216 \pm 11	H α , β , γ , SP

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
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RP s1260	05 15 10.00	-70 01 21.6	BE74231	B3III[e]	-14.07	52 \pm 3	61 \pm 2	241 \pm 1	18 \pm 1	H α , β , γ , [S II], [N II], [O II]
RP s1524	05 15 41.41	-67 58 52.4		B4III[e]	-12.29	412 \pm 21	18 \pm 1	316 \pm 1	302 \pm 15	H α , β , γ , [S II], [N II], [O II], dense H II halo surrounding, SP
RP s1582	05 15 45.61	-66 58 42.3		B1Ve	-14.99	42 \pm 2	55 \pm 2	291 \pm 1	7 \pm 0	H α , p cyg on H β
RP s1469	05 15 48.74	-68 33 04.0	SAB1899	B1.7Ve	-13.92	98 \pm 5	27 \pm 1	272 \pm 3	49 \pm 2	H α only
RP s1414	05 16 24.57	-68 55 27.6		B3V[e]	-12.97	302 \pm 15	186 \pm 7	232 \pm 1	349 \pm 18	H α , β , γ , [S II], [N II], [O II], Poor spectral fit
RP s1335	05 16 27.14	-69 26 22.6		B1Ve	-13.41	262 \pm 13	78 \pm 3	219 \pm 4	246 \pm 12	H α , β , DP V>R
RP s1529	05 16 31.96	-67 56 50.2	SAB899	B2V[e]	-13.52	102 \pm 5	21 \pm 1	293 \pm 2	47 \pm 2	H α , β , γ , [S II], [N II], [O II]
RP s1334	05 16 33.24	-69 31 29.2		F0Ve	-13.04	188 \pm 9	102 \pm 4	273 \pm 3	178 \pm 9	H α , β only
RP s1423	05 16 39.06	-68 53 20.5		B3Ve	-14.57	95 \pm 5	8 \pm 0	238 \pm 1	25 \pm 1	H α only + HeI 4144 in emission
RP s1386	05 16 39.11	-69 20 47.9	SAB899	B3Ve	-13.41	339 \pm 17	79 \pm 3	274 \pm 4	328 \pm 16	H α only, DP centre
RP s1382	05 16 52.29	-69 33 56.4	SAB631	B1Ve	-13.37	76 \pm 6	15 \pm 1	291 \pm 4	20 \pm 5	H α , β , SP bottle-shape
RP s1381	05 17 01.02	-69 34 10.5	SAB138	B1Ve	-12.54	226 \pm 11	48 \pm 2	249 \pm 4	184 \pm 9	H α , β , SP
RP s1525	05 17 06.93	-68 00 27.8	SVHV 5717	B2V[e]	-13.98	134 \pm 7	52 \pm 2	211 \pm 5	98 \pm 5	H α , β , [S II], [N II]strong central H α emission, SP
RP s1526	05 17 07.33	-68 00 18.5		B1Ve	-13.21	356 \pm 18	63 \pm 3	276 \pm 4	328 \pm 16	H α , β
RP s1331	05 17 08.13	-69 07 02.1		B1.7V[e]	-13.10	48 \pm 2	80 \pm 3	267 \pm 1	17 \pm 1	H α , β , [N II], [S II], [O II], [O II], SP
RP s2054	05 17 08.93	-69 32 21.1	B3III[e]		-14.51	419 \pm 21	86 \pm 3	280 \pm 4	424 \pm 21	H α , [N II]but no [O III].
RP s1588	05 17 31.40	-66 43 30.1			-12.77	291 \pm 15	149 \pm 6	320 \pm 1	317 \pm 16	H α , β , γ , [S II], [N II], [O II]
RP s1537	05 17 34.45	-67 50 08.8		B1IIe	-13.81	257 \pm 13	42 \pm 2	303 \pm 4	208 \pm 10	H α , β
RP s1538	05 17 35.37	-67 46 40.3	B1Ve		-13.33	299 \pm 15	78 \pm 3	289 \pm 4	285 \pm 14	H α , β
RP s1592	05 17 40.69	-66 42 08.8		B0III[e]	-12.82	327 \pm 16	83 \pm 3	196 \pm 4	324 \pm 16	H α , β , [S II], [N II]
RP s1591	05 17 40.80	-66 42 04.8		B3III[e]	-12.81	216 \pm 11	93 \pm 4	301 \pm 15	209 \pm 10	H α , β , γ , [S II], [N II], [O II]
RP s1593	05 17 40.96	-66 42 08.7	B3III[e]		-12.90	208 \pm 10	157 \pm 6	319 \pm 1	225 \pm 11	H α , β , γ , [S II], [N II]
RP s1478	05 17 46.26	-68 30 03.2		B1Ve	-13.32	351 \pm 18	49 \pm 2	308 \pm 5	305 \pm 15	H α , β
RP s1374	05 17 53.26	-69 11 44.1	BE74242	B2IIe	-12.66	291 \pm 15	37 \pm 1	292 \pm 4	233 \pm 12	H α , β , low [O III] 5007 from ambient emission in area
RP s1373	05 17 57.65	-69 11 10.3	BE74242	B2IIe	-12.09	513 \pm 26	106 \pm 4	305 \pm 10	555 \pm 28	H α , β
RP s1384	05 17 59.80	-69 30 07.6	A3IIe		-12.77	460 \pm 23	60 \pm 2	283 \pm 13	433 \pm 22	H α , β
RP s1383	05 18 02.98	-69 29 49.1		B0Ve	-13.00	309 \pm 15	32 \pm 1	237 \pm 3	243 \pm 12	H α , β , SP
RP s1448	05 18 08.15	-68 42 39.9		B1V[e]	-13.53	99 \pm 5	51 \pm 2	313 \pm 2	63 \pm 3	H α , β , [S II], [N II]
RP s1503	05 18 59.76	-68 14 39.4	B1Ve		-13.47	301 \pm 15	48 \pm 2	261 \pm 4	257 \pm 13	H α , β
RP s1514	05 19 07.79	-68 05 42.0		B1IIe	-12.63	242 \pm 12	48 \pm 2	303 \pm 3	200 \pm 10	H α , β
RP s1517	05 19 07.91	-68 02 57.7		B1.5Ve	-14.17	319 \pm 16	36 \pm 1	288 \pm 4	260 \pm 13	H α , + [O I] 6300, 6363
RP s1468	05 19 08.33	-68 34 01.5	B1Ve		-13.84	206 \pm 10	56 \pm 2	282 \pm 3	170 \pm 9	H α , β
RP s1339	05 19 11.45	-69 41 55.9		B1Ve	-13.34	175 \pm 9	45 \pm 2	249 \pm 3	134 \pm 7	H α , β , other weak forbidden line probably from ambient emission, SP
RP s1437	05 19 12.83	-68 44 04.6		B5.7Ve	-14.38	363 \pm 18	28 \pm 1	302 \pm 3	284 \pm 14	H α only
RP s1506	05 19 17.99	-68 13 45.0	B1Ve		-12.94	327 \pm 16	67 \pm 3	309 \pm 4	306 \pm 15	H α , β
RP s1479	05 19 25.11	-68 29 36.7		B3IIe	-13.55	73 \pm 4	107 \pm 4	271 \pm 2	52 \pm 3	H α , β , [S II]. H II emission extending 1 arcsec on w side of star. Companion? To immediate E.
RP s1149	05 19 29.28	-71 15 50.7	B1.7V[e]		-12.56	245 \pm 12	53 \pm 2	226 \pm 3	208 \pm 10	H α , β weak [S II], [O III]
RP s1436	05 19 33.68	-68 45 24.5		B1Ve	-14.10	112 \pm 6	44 \pm 2	274 \pm 1	73 \pm 4	H α only
RP s1370	05 19 34.20	-69 57 50.6		B3Ve	-13.07	275 \pm 14	33 \pm 1	258 \pm 3	212 \pm 11	H α , β , SP
RP s1539	05 19 37.30	-67 49 30.5	B0.5IIe		-13.10	384 \pm 19	44 \pm 2	294 \pm 5	338 \pm 17	H α , β
RP s1340	05 19 44.00	-69 40 28.3		B1V[e]	-13.37	56 \pm 3	47 \pm 2	243 \pm 1	18 \pm 1	H α , β , [O II], [O III], [S II], [N II], SP
RP s1449	05 20 11.54	-68 37 53.7		F5IIe	-13.49	259 \pm 13	107 \pm 4	293 \pm 14	264 \pm 13	H α
RP s1452	05 20 12.96	-68 38 08.3	B2Ve		-13.72	95 \pm 5	26 \pm 1	269 \pm 1	44 \pm 2	H α only
RP s1342	05 20 15.34	-69 40 29.0		B1Ve	-14.06	117 \pm 6	6 \pm 0	278 \pm 1	33 \pm 2	H α only, SP
RP s1600	05 20 17.83	-66 52 53.6		B2Ve	-13.14	332 \pm 17	69 \pm 3	313 \pm 1	312 \pm 16	H α , β , ([S II], [N II], [O II], [O III] from dense compact H II region 12 x 16 arcsec).
RP s1265	05 20 34.34	-70 00 33.0	B8Ve		-13.41	214 \pm 11	55 \pm 2	259 \pm 3	178 \pm 9	H α , β
RP s1356	05 20 39.89	-69 44 59.1		B1IIe	-12.71	290 \pm 14	57 \pm 2	259 \pm 4	260 \pm 13	H α , β , SP
RP s1586	05 20 40.11	-66 48 49.2		B3Ve	-14.22	85 \pm 4	13 \pm 1	305 \pm 1	25 \pm 1	H α , β , Centre star of faint emission 25 arcsec radius.
RP s1355	05 20 45.17	-69 58 24.5	B7Ve		-14.07	371 \pm 19	36 \pm 1	258 \pm 3	308 \pm 15	H α only, SP
RP s1343	05 20 47.86	-69 39 56.2		A7V[e]	-13.14	272 \pm 14	60 \pm 2	308 \pm 3	242 \pm 12	H α , β , [S II], [O III], DP R>V
RP s1238	05 20 49.08	-70 12 40.8		A3V[e]		366 \pm 18	15 \pm 1	305 \pm 1	249 \pm 12	with [O III] emission on star. No H emission. SP
RP s1344	05 20 51.12	-69 38 28.9	BE74565	B1IIe	-12.72	486 \pm 24	101 \pm 4	259 \pm 7	510 \pm 26	H α , β , DP centre
RP s1173	05 20 54.35	-70 49 42.1	SAB817	B1IIe	-12.66	374 \pm 19	69 \pm 3	225 \pm 5	356 \pm 18	H α , β , SP
RP s1535	05 20 57.37	-67 49 21.1	BE74255	B3IIe	-13.29	98 \pm 5	33 \pm 1	304 \pm 2	51 \pm 3	H α , p cyg on H β , In dense H II region 20 x 14 arcsec dia
RP s1368	05 21 05.22	-69 01 03.3	B1.5Ve		-13.46	442 \pm 22	42 \pm 2	281 \pm 4	383 \pm 19	H α only
RP s1156	05 21 15.37	-71 05 29.8		B1Ve	-14.46	536 \pm 27	24 \pm 1	157 \pm 3	426 \pm 21	H α only
RP s1365	05 21 16.97	-69 04 57.8		B2Ve	-13.48	324 \pm 16	64 \pm 3	308 \pm 4	304 \pm 15	H α , β

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
RPs1360	05 21 17.30	-69 19 53.9	BE74257	B5IIIe	-12.73	262 \pm 13	38 \pm 2	251 \pm 4	213 \pm 11	H α , β
RPs1542	05 21 20.43	-67 47 06.8	IRAS-P.C05214 -6749	B2IV[e]	-13.46	49 \pm 2	233 \pm 9	279 \pm 1	36 \pm 2	H α , β , [N II], [S II], [O II], SP
RPs1266	05 21 21.48	-69 59 00.2		A2Ve	-14.02	320 \pm 16	30 \pm 1	300 \pm 1	246 \pm 12	H α , β , similar size star 3 arcsec to SW.
RPs1362	05 21 29.45	-69 07 25.4		B1Ve	-14.04	256 \pm 13	41 \pm 2	285 \pm 1	207 \pm 10	H α , β
RPs1494	05 21 31.88	-68 20 59.5	AL 146	B3IIIe	-12.79	287 \pm 14	42 \pm 2	253 \pm 4	236 \pm 12	H α , β , [O III] from ambient H II
RPs1367	05 21 36.06	-69 02 30.7		B0Ve	-13.79	222 \pm 11	16 \pm 1	262 \pm 1	135 \pm 7	H α , (H β is fully absorbed). Forbidden [N II] & [S II] from strong H II region to south
RPs1481	05 21 36.52	-68 28 55.7	MACHO3.6722.273	B1IIIe	-13.66	217 \pm 11	20 \pm 1	277 \pm 3	140 \pm 7	strong [O III]
RPs1543	05 21 38.09	-67 46 52.1		B0V[e]	-12.75	399 \pm 20	40 \pm 2	300 \pm 2	343 \pm 17	H α , β , [S II], [N II], [O II], [O II], strong H II surrounding & North
RPs1480	05 21 38.47	-68 28 21.1		B3Ve	-13.59	477 \pm 24	64 \pm 3	481 \pm 1	462 \pm 23	H α only, SP,
RPs1359	05 21 40.54	-69 26 06.1	SAB2199	F5IVe	-13.18	342 \pm 17	43 \pm 2	257 \pm 5	289 \pm 14	H α , β , SP
RPs715	05 21 47.25	-69 52 33.5		F5IVe	-13.49	263 \pm 13	32 \pm 1	240 \pm 4	202 \pm 10	H α , β , SP
RPs2173	05 21 54.96	-69 46 35.9		BIIIe	-13.02	202 \pm 10	35 \pm 1	273 \pm 4	151 \pm 8	H α , β , γ , SP
RPs852	05 22 02.11	-69 02 05.8		A0V[e]	-14.07	121 \pm 6	21 \pm 1	267 \pm 2	64 \pm 3	H α only, [N II], [S II], [O II]
RPs2174	05 22 02.73	-69 46 14.5	AGPRSJ052204. 08-694619.6	BIIIe	-14.02	99 \pm 5	18 \pm 1	274 \pm 4	43 \pm 2	H α , β , kown variable within H II region. SP
RPs985	05 22 03.16	-67 47 04.3		B2V[e]	-13.38	210 \pm 10	95 \pm 4	283 \pm 24	202 \pm 10	H α , β , [S II], [N II], [O II], [O II], diffuse H II in area
RPs606	05 22 07.95	-70 17 01.1		B1Ve	-13.12	190 \pm 10	17 \pm 1	219 \pm 3	114 \pm 6	H α only
RPs718	05 22 10.51	-69 49 43.1		B0V[e]	-13.79	53 \pm 3	23 \pm 1	236 \pm 1	6 \pm 0	H α , β , [S II], [N II], bright star 5 arcsec to SE, SP
RPs1059	05 22 10.82	-67 34 50.6		B1V[e]	-13.69	77 \pm 4	30 \pm 1	294 \pm 1	31 \pm 2	H α , β , [S II]
RPs813	05 22 14.14	-69 19 30.6		B1Ve	-13.57	321 \pm 16	49 \pm 2	263 \pm 4	276 \pm 14	H α , β only, SP
RPs854	05 22 17.44	-69 03 04.8		B3Ve	-13.47	483 \pm 24	44 \pm 2	306 \pm 3	434 \pm 22	H α , β , SP
RPs716	05 22 17.90	-69 50 49.1	MACHO78.6822.56	B1Ve	-12.89	106 \pm 6	14 \pm 1	247 \pm 2	43 \pm 3	H α , β , SP, Bottle shape
RPs925	05 22 22.88	-68 41 00.8		A0IVe	-13.61	245 \pm 12	41 \pm 2	290 \pm 3	196 \pm 10	H α , low level β
RPs853	05 22 28.54	-69 00 43.2	MACHO80.6835.21	B1IIIe	-13.06	175 \pm 9	26 \pm 1	268 \pm 3	113 \pm 6	H α , β
RPs600	05 22 30.03	-70 23 53.6	L63206	F2IIIe	-13.01	274 \pm 14	29 \pm 1	245 \pm 3	205 \pm 10	H α only
RPs978	05 22 39.72	-67 55 24.7		B1.7V[e]	-13.26	326 \pm 16	167 \pm 7	282 \pm 79	369 \pm 19	H α , β , [S II], [N II], [O II], [O III], [N II], SP
RPs948	05 22 48.19	-68 32 41.7		B2V[e]	-13.56	114 \pm 6	28 \pm 1	287 \pm 1	63 \pm 3	H α , [N II], [S II]
RPs924	05 22 54.11	-68 41 42.7		B2Ve	-13.67	260 \pm 13	39 \pm 2	296 \pm 3	210 \pm 11	H α only
RPs871	05 22 54.20	-69 40 09.6	SAB2268	B1V[e]	-13.10	506 \pm 25	37 \pm 1	248 \pm 14	433 \pm 22	H α , β , weak [S II], [N II], SP
RPs901	05 22 58.45	-68 45 34.6		A1Ie	-14.01	385 \pm 19	37 \pm 1	281 \pm 6	321 \pm 16	H α , β very low
RPs752	05 22 58.47	-69 44 01.5		F2III[e]	-13.36	129 \pm 6	25 \pm 1	274 \pm 1	74 \pm 4	H α , β , [S II], [O II], [O III], [N II], SP
RPs984	05 22 59.58	-68 04 07.9		B5III[e]	-13.02	108 \pm 5	25 \pm 1	304 \pm 2	55 \pm 3	H α , β , [N II], [S II], [O II], [O III], SP
RPs962	05 23 00.14	-68 11 21.3		B1V[e]	-13.08	90 \pm 17	37 \pm 1	270 \pm 2	33 \pm 17	H α , β , some portion of the forbidden lines from ambient H II environment. SP, Bottle shape
RPs814	05 23 05.25	-69 16 12.1	SAB2287	B0IIIe	-12.96	274 \pm 14	41 \pm 2	253 \pm 4	224 \pm 11	H α , β , γ only
RPs1054	05 23 07.93	-67 38 14.1		F0IIIe	-13.13	318 \pm 16	37 \pm 1	317 \pm 12	259 \pm 13	H α , β
RPs420	05 23 12.37	-70 47 51.1		A2Ve	-14.66	469 \pm 23	32 \pm 1	218 \pm 4	388 \pm 19	H α alone
RPs761	05 23 17.39	-69 40 53.5		F0Ve	-14.45			269 \pm 1		H α alone
RPs870	05 23 17.43	-69 38 50.4	BE74574	B2IV[e]	-12.18	254 \pm 13	88 \pm 4	286 \pm 4	245 \pm 12	H α , β , γ , δ , He4471 in emission. Much weaker forbidden lines, DP R>V
RPs982	05 23 17.73	-67 59 38.9		B2V[e]	-13.72	59 \pm 3	49 \pm 2	284 \pm 1	23 \pm 1	H α , β , [S II], [NI], [O II], [O III], SP
RPs922	05 23 21.91	-68 39 53.9		B1.7Ve	-13.98	91 \pm 5	6 \pm 0	285 \pm 1	16 \pm 1	H α only in emission
RPs762	05 23 22.81	-69 41 15.3		B3III[e]	-13.63	385 \pm 19	29 \pm 1	243 \pm 8	303 \pm 15	H α , β some associated emission, SP
RPs1010	05 23 24.32	-70 39 08.0	MACHO6.6931.37	B1Ve	-13.38	237 \pm 12	20 \pm 1	235 \pm 3	157 \pm 8	H α , β
RPs552	05 23 26.98	-70 41 26.9		B1IVe	-13.21	278 \pm 14	38 \pm 2	223 \pm 4	221 \pm 11	H α , β
RPs1094	05 23 30.46	-66 41 53.4		B0.5IIIe	-13.04	280 \pm 14	49 \pm 2	287 \pm 3	237 \pm 12	H α , β
RPs983	05 23 31.90	-68 01 00.9		B2IV[e]	-13.11	53 \pm 3	72 \pm 3	289 \pm 2	23 \pm 1	H α , β , [N II], [S II], [O II], in cocoon, SP
RPs1062	05 23 33.30	-67 24 10.2		B3III[e]	-13.34	86 \pm 4	39 \pm 2	302 \pm 2	45 \pm 2	H α , Pcyg on H β , [S II], [O II], [N II], in assoc. of stars.
RPs961	05 23 40.48	-68 05 28.8		B1V[e]	-13.27	59 \pm 3	30 \pm 1	270 \pm 1	16 \pm 1	H α , β , [N II], [S II], SP
RPs966	05 23 47.74	-67 56 32.4		B2V[e]	-13.83	281 \pm 14	53 \pm 2	284 \pm 10	244 \pm 12	H α , β , [S II], [NI], [O II]
RPs964	05 23 49.64	-67 57 26.3		F5V[e]	-13.35	230 \pm 11	122 \pm 5	308 \pm 1	238 \pm 12	H α , β , γ , [N II], [S II], SP
RPs899	05 24 03.12	-68 56 21.4		B0V[e]	-12.93	331 \pm 17	31 \pm 1	279 \pm 1	263 \pm 13	H α , β , [N II], [O II], [S II], in cocoon
RPs928	05 24 06.36	-68 41 59.2		B2IIe	-12.67	206 \pm 10	30 \pm 1	259 \pm 3	150 \pm 8	H α , β . Indication of forbidden lines may be H II in area.
RPs898	05 24 09.71	-68 57 04.0		B2V[e]	-13.77	322 \pm 16	29 \pm 1	266 \pm 1	248 \pm 12	H α , β , [N II], [O II], [S II], extensive H α emission surrounding star
RPs804	05 24 11.91	-69 21 17.8		B8V[e]	-14.32	88 \pm 8	10 \pm 1	259 \pm 2	23 \pm 5	H α , β , [S II], [N II], [O II], SP, Bottle shape
RPs1061	05 24 12.33	-67 26 37.7		B3IV[e]	-13.57	90 \pm 4	110 \pm 4	311 \pm 16	71 \pm 4	H α , β , [S II], [N II], [O II], [O III], SP
RPs1060	05 24 12.47	-67 26 32.6		B2IVe	-13.69	94 \pm 5	42 \pm 2	279 \pm 2	52 \pm 3	H α , β , [S II], [N II] mainly from surrounding nebula
RPs847	05 24 12.49	-69 13 20.5		B3IIIe	-12.78	227 \pm 11	46 \pm 2	275 \pm 3	185 \pm 9	H α , β only, SP

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
RPs778	05 24 14.14	-69 27 40.3		B1III[e]	-13.41	101 \pm 5	9 \pm 0	277 \pm 1	31 \pm 2	H α , β , [S II]& some associated [N II]emission, SP
RPs601	05 24 17.73	-71 31 50.2	BE74580	B3V[e]	-12.45	96 \pm 5	43 \pm 2	238 \pm 1	55 \pm 3	H α , β , γ , δ , [O II] 3727, [N II], [S II], relatively low continuum levels suggest active H II region
RPs873	05 24 23.07	-69 39 08.9	BE74579	B3V[e]	-13.04	88 \pm 4	62 \pm 2	272 \pm 1	55 \pm 3	H α , β , [S II], [O II], [N II]
RPs874	05 24 23.70	-69 38 53.6	BE74579	B3V[e]	-13.31	338 \pm 17	50 \pm 2	246 \pm 25	301 \pm 15	H α , β , [S II], [O II]
RPs1073	05 24 27.98	-67 09 10.4		B3III[e]	-12.99	86 \pm 4	74 \pm 3	303 \pm 2	59 \pm 3	H α , Pcyg on hb, [S II], [O II], [N II]
RPs817	05 24 37.95	-69 15 36.8		F3Ve	-14.05	174 \pm 9	33 \pm 1	276 \pm 3	120 \pm 6	H α only, SP
RPs1055	05 24 46.26	-67 38 11.1	BE74266	B3IIe	-13.50	241 \pm 12	41 \pm 2	287 \pm 3	193 \pm 10	H α , β , HeII4686
RPs1109	05 24 57.81	-67 24 58.2		B1Ve	-12.88	287 \pm 14	103 \pm 4	283 \pm 4	289 \pm 14	H α , β , γ
RPs2147	05 24 58.51	-69 03 04.5	FAUST844	BIII[e]	-13.24	224 \pm 11	36 \pm 1	292 \pm 4	171 \pm 9	H α , β , [S II], [N II], [O II], SP
RPs944	05 25 00.39	-68 19 30.4		B2V[e]	-13.27	50 \pm 2	37 \pm 1	265 \pm 1	10 \pm 1	H α , β , [N II], [S II], [O II], HeII4686.
RPs567	05 25 01.95	-70 37 09.5		B2IIe	-13.32	522 \pm 26	37 \pm 1	244 \pm 11	448 \pm 22	H α , β
RPs2155	05 25 05.75	-69 06 56.5			-14.36	435 \pm 22	53 \pm 2	274 \pm 4	397 \pm 20	H α , β
RPs943	05 25 10.22	-68 25 16.4	BE74268	B2III[e]	-13.05	60 \pm 3	71 \pm 3	263 \pm 2	29 \pm 1	H α , [N II], [S II], [O II]
RPs800	05 25 10.89	-69 20 37.1		B1V[e]	-13.47	102 \pm 5	33 \pm 1	280 \pm 1	55 \pm 3	H α , β , [N II], [S II], [O III], within H II region, SP
RPs707	05 25 12.29	-69 55 26.9	SAB2388	B3IIe	-13.21	257 \pm 13	26 \pm 1	273 \pm 4	185 \pm 9	H α , β , SP
RPs2149	05 25 20.02	-69 20 24.3		BIII[e]	-14.44	433 \pm 22	34 \pm 1	288 \pm 4	365 \pm 18	H α , β , [S II], [N II], [O II]within dense H II region. DP-R>V
RPs869	05 25 25.72	-69 12 55.7		B3IIe	-12.84	281 \pm 14	59 \pm 2	283 \pm 27	237 \pm 12	H α , β , [N II], [S II] and [O III] some due to local emission. SP
RPs724	05 25 29.68	-69 50 30.4		A2Ibe	-14.12	193 \pm 10	4 \pm 0	225 \pm 6	74 \pm 4	H α only, SP
RPs725	05 25 39.77	-69 50 59.7		B1.7V[e]	-13.80	60 \pm 3	45 \pm 2	272 \pm 1	23 \pm 1	H α , β , [S II], [O II], SP
RPs942	05 25 40.09	-68 30 46.1	AL182	B1IIIe	-12.18	299 \pm 15	64 \pm 3	294 \pm 4	278 \pm 14	H α , β , γ
RPs727	05 25 44.66	-69 53 20.5		B1V[e]	-13.76	319 \pm 16	28 \pm 1	278 \pm 1	245 \pm 12	H α , Pcyg on Hb, [S II], [N II], [O II], [O III]
RPs2166	05 25 46.00	-69 14 02.3		B3V[e]	-13.20	286 \pm 14	49 \pm 2	293 \pm 4	249 \pm 13	H α , β , [S II], [N II], [O II], SP
RPs2146	05 25 50.55	-69 05 29.4		BV[e]	-14.42	369 \pm 18	13 \pm 1	253 \pm 5	244 \pm 12	H α , β , [S II], [N II], [O II], [O III], SP
RPs779	05 25 50.62	-69 27 33.1	SAB2427	B3III[e]	-12.70	207 \pm 10	43 \pm 2	285 \pm 1	160 \pm 8	H α , β , [N II], [S II], [O II]
RPs672	05 25 56.58	-70 15 06.6		B3Ve	-13.35	330 \pm 17	28 \pm 1	288 \pm 4	255 \pm 13	H α , β only, SP
RPs592	05 25 58.15	-70 28 42.4		B5IIe	-12.85	391 \pm 20	52 \pm 2	226 \pm 4	353 \pm 18	H α , β only
RPs886	05 26 00.41	-69 53 27.0	BE74581	B5IIe	-12.47	495 \pm 25	72 \pm 3	337 \pm 18	481 \pm 24	H α , β , Bpe, semi-regular pulsating star. DP R>V
RPs988	05 26 05.58	-68 36 26.4	BE74276	B1V[e]	-12.90	338 \pm 17	99 \pm 4	247 \pm 55	345 \pm 17	H α , β , [S II], [N I], [O II], [O III]
RPs989	05 26 07.35	-68 36 35.9	BE74276	B1.7Ve	-13.29	67 \pm 3	47 \pm 2	260 \pm 2	29 \pm 2	H α , β , weak forbidden lines [S II], [N II], [O III], [O II]belong to compact H II in area
RPs2162	05 26 11.28	-69 19 21.5		BV[e]	-13.11	74 \pm 8	12 \pm 1	296 \pm 4	14 \pm 6	H α , β , [S II], [N II], [O II]. SP, Bottle shape
RPs798	05 26 13.74	-69 25 45.1		A0Ve	-13.95	482 \pm 24	26 \pm 1	333 \pm 6	379 \pm 19	H α only
RPs2160	05 26 22.19	-69 18 07.4	BE74227	BIII[e]	-12.72	249 \pm 12	35 \pm 1	291 \pm 4	195 \pm 10	H α , β , [S II], [N II], [O II], within dense H II region. SP
RPs1110	05 26 30.57	-67 40 36.5		F2III[e]	-12.56	104 \pm 5	144 \pm 6	311 \pm 2	94 \pm 5	H α , β , γ , δ , possible emO with weak continuum
RPs878	05 26 34.51	-69 06 32.3		B1Ve	-12.84	266 \pm 13	64 \pm 3	210 \pm 25	243 \pm 12	H α , β , [S II] and [O III] is ambient, SP
RPs818	05 26 44.77	-69 14 55.7		B1Ve	-13.34	202 \pm 10	31 \pm 1	262 \pm 3	146 \pm 7	H α , β , SP
RPs845	05 26 46.73	-69 11 58.3		B2Ve	-13.66	173 \pm 9	34 \pm 1	305 \pm 2	124 \pm 6	H α , β , DP R>V
RPs941	05 26 49.05	-68 25 45.5		B2V[e]	-13.29	59 \pm 3	88 \pm 4	244 \pm 1	32 \pm 2	H α , [N II], [S II]
RPs859	05 26 51.89	-69 00 30.4		B3Ve	-13.80	412 \pm 21	36 \pm 1	232 \pm 2	346 \pm 17	H α is mostly from ambient emission, SP
RPs858	05 26 52.67	-69 00 49.3		B9Ve	-14.14	296 \pm 15	63 \pm 3	244 \pm 3	267 \pm 13	H α only
RPs542	05 26 53.39	-71 22 08.2	LI-SMC235	B0IV[e]	-12.80	339 \pm 17	146 \pm 6	246 \pm 2	375 \pm 19	H α , β , γ , δ , [O II] 3727, [N II], [S II]
RPs1011	05 27 00.26	-71 18 54.5		B6Ve	-13.26	226 \pm 11	36 \pm 1	282 \pm 3	173 \pm 9	H α only
RPs730	05 27 02.49	-69 52 17.2	MACHO77.7548.102	B2IIe	-13.02	259 \pm 13	28 \pm 1	299 \pm 3	192 \pm 10	H α , β , SP
RPs731	05 27 02.99	-69 46 00.7	AGPRSJ052702. 99-694600.7	B5IIe	-12.85	288 \pm 14	22 \pm 1	289 \pm 4	205 \pm 10	H α , β , SP
RPs797	05 27 03.26	-69 24 26.7		B1Ve	-13.21	340 \pm 17	39 \pm 2	300 \pm 5	287 \pm 14	H α , β , weak [O III], DP R>V
RPs599	05 27 07.19	-70 20 02.1		B3Ve	-13.23	144 \pm 7	110 \pm 4	247 \pm 2	132 \pm 7	H α , β
RPs820	05 27 11.02	-69 15 55.1		B3IIe	-12.56	295 \pm 15	36 \pm 1	251 \pm 4	237 \pm 12	H α , β , SP
RPs1108	05 27 12.29	-67 23 47.9	AL 198	B0.5IIe	-12.22	237 \pm 12	80 \pm 3	319 \pm 4	219 \pm 11	H α , β , γ
RPs765	05 27 13.11	-69 42 12.3	MACHO77.7550.54	B3Ve	-13.02	505 \pm 25	21 \pm 1	253 \pm 7	388 \pm 19	H α , weak H β , DP centre, sh
RPs2157	05 27 15.26	-69 14 36.8	L63236	BIIIe	-12.49	174 \pm 9	42 \pm 2	289 \pm 4	129 \pm 6	H α , β , SP
RPs536	05 27 20.01	-71 14 01.8		B1IIIe	-13.09	210 \pm 10	29 \pm 1	233 \pm 3	148 \pm 7	H α , β
RPs821	05 27 42.74	-69 14 11.9		B1Ve	-13.01	366 \pm 18	71 \pm 3	296 \pm 5	347 \pm 17	H α , β only, DP centre
RPs1107	05 27 43.16	-67 25 47.7	AL 203	B2IV[e]	-12.64	130 \pm 6	115 \pm 5	328 \pm 1	116 \pm 6	H α , β , γ , δ , ϵ , [S II], [N II], [O II]. Ambient H II close by. Weak [O III] probably from ambient emission.
RPs861	05 27 43.63	-69 03 21.6		B1V[e]	-13.11	330 \pm 16	61 \pm 2	279 \pm 3	301 \pm 15	H α , β , [O III], [S II]
RPs842	05 27 44.38	-69 08 32.2		B5IIe	-12.79	469 \pm 23	55 \pm 2	238 \pm 23	431 \pm 22	H α , β , SP
RPs843	05 27 47.62	-69 09 27.6		B2IIe	-12.74	510 \pm 26	64 \pm 3	247 \pm 29	497 \pm 25	H α , β , SP

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
RP605	05 27 49.37	-71 31 19.8	AL 207	A1V[e]	-13.37	251 \pm 13	60 \pm 2	247 \pm 2	221 \pm 11	H α , β , γ , δ , [O II] 3727, [N II], [S II], [O III] 5007
RP1057	05 28 02.72	-67 31 16.5		B2IIe	-12.18	256 \pm 13	72 \pm 3	324 \pm 4	239 \pm 12	H α , β some diffuse emission in area.
RP840	05 28 03.99	-69 09 57.2		B4IVe	-12.96	453 \pm 23	70 \pm 3	248 \pm 17	438 \pm 22	H α , β , SP
RP2185	05 28 04.23	-69 05 26.8	SVHV 2565	B0Ve	-13.89	182 \pm 9	19 \pm 1	294 \pm 4	111 \pm 6	H α , β , DP centre
RP823	05 28 04.41	-69 13 33.0		B1.7Ve	-13.17	430 \pm 22	47 \pm 2	241 \pm 11	382 \pm 19	H α , β , SP
RP822	05 28 07.61	-69 14 28.4		B1V[e]	-13.12	345 \pm 17	44 \pm 2	286 \pm 4	300 \pm 15	H α , β , [O III] 5007 weak. Possible symbiotic, SP
RP841	05 28 08.09	-69 10 22.6	BE74589	B2Ve	-14.17	213 \pm 12	25 \pm 1	264 \pm 16	146 \pm 9	ambient emission brings in the [O III] 5007 line, SP, Bottle shape
RP702	05 28 14.06	-69 54 37.9		F0IIe	-12.52	394 \pm 20	43 \pm 2	335 \pm 5	338 \pm 17	H α , β , FeII 4173, 4179
RP879	05 28 20.08	-68 59 10.4		B0IIe	-12.50	155 \pm 8	65 \pm 3	258 \pm 3	127 \pm 6	H α , β , SP
RP512	05 28 20.82	-70 59 22.4	BE74300	B2IIe	-12.63	393 \pm 20	32 \pm 1	216 \pm 22	319 \pm 16	H α , β
RP2186	05 28 27.04	-69 05 37.5		BVe	-12.73	163 \pm 8	45 \pm 2	294 \pm 4	123 \pm 6	H α , β , low [O III] due to ambient emission. SP
RP510	05 28 28.87	-71 00 48.5		B5V[e]	-13.95	84 \pm 4	3 \pm 0	225 \pm 1	4 \pm 0	H α , [N II], [S II], [O III], SP
RP796	05 28 32.24	-69 19 56.8	BE74307	B1Ve	-13.83	278 \pm 14	32 \pm 1	280 \pm 3	215 \pm 11	H α , β , γ
RP472	05 28 36.50	-70 56 21.4		B2IIe	-11.92	341 \pm 17	49 \pm 2	225 \pm 5	296 \pm 15	H α , β , γ , Hel absorption
RP436	05 28 36.57	-70 48 25.9		B2IIe	-13.14	401 \pm 20	39 \pm 2	187 \pm 6	344 \pm 17	H α , β only
RP839	05 28 38.27	-69 11 07.6	MACHO77.7788.54	B0IIe	-12.31	239 \pm 12	35 \pm 1	264 \pm 4	185 \pm 9	H α , β , γ , SP
RP688	05 28 40.90	-70 01 38.1		B2IIe	-12.99	329 \pm 16	59 \pm 2	203 \pm 5	300 \pm 15	H α , β
RP2179	05 28 45.59	-68 59 23.7		B1Ve	-12.78	157 \pm 8	63 \pm 3	285 \pm 5	130 \pm 7	H α , β , close to H II region. DP centre
RP2181	05 28 48.85	-69 01 19.6	MACHO77.7918.68	BIII[e]	-12.69	297 \pm 15	56 \pm 2	283 \pm 5	260 \pm 13	H α , β , [O III], in H II region, SP
RP784	05 28 53.10	-69 24 51.4		B3Ve	-13.87	129 \pm 6	25 \pm 1	272 \pm 3	73 \pm 4	H α , β
RP783	05 28 57.69	-69 25 09.5		A7III[e]	-13.84	288 \pm 14	31 \pm 1	258 \pm 5	224 \pm 11	H α , β , [O III]
RP2182	05 28 58.82	-69 03 55.0	BE74309	BVe	-13.84	377 \pm 19	57 \pm 2	276 \pm 4	349 \pm 18	H α , β , in H II region. SP
RP794	05 29 01.97	-69 22 50.6		B1IIe	-12.20	184 \pm 9	100 \pm 4	274 \pm 3	174 \pm 9	H α , β , γ , Bpe
RP2183	05 29 02.92	-69 04 29.1		BIIIe	-14.11	242 \pm 12	43 \pm 2	281 \pm 3	193 \pm 10	H α , β , in H II region, SP
RP880	05 29 07.24	-69 04 51.3	BE74313	B1.5V[e]	-13.73	175 \pm 9	88 \pm 4	278 \pm 2	158 \pm 8	H α , β , most [S II], [N II], [O II] , [O III] from ambient H II emission in area. DP R>V
RP838	05 29 21.10	-67 01 17.8		B1Ve	-13.96	163 \pm 8	16 \pm 1	269 \pm 2	92 \pm 5	H α only but mainly from ambient emission, SP
RP887	05 29 22.39	-69 00 11.8		B3Ve	-13.88	347 \pm 17	29 \pm 1	272 \pm 2	270 \pm 14	H α , β , γ ,[O III] ,[N II],[S II], DP V>R
RP836	05 29 22.71	-69 10 13.8	AL 233	B0.5IIe	-12.47	207 \pm 10	27 \pm 1	272 \pm 3	146 \pm 7	H α , β , weak [O III], SP
RP995	05 29 28.71	-68 28 29.9		B3V[e]	-13.96	97 \pm 5	52 \pm 2	273 \pm 1	61 \pm 3	H α , β ambient emission producing [S II], [N II][O II] and [O III]
RP1056	05 29 41.19	-67 35 48.2		B3IIe	-13.09	297 \pm 15	32 \pm 1	291 \pm 5	232 \pm 12	H α , β
RP864	05 29 41.40	-69 06 53.4	SAB955	B5IIe	-12.83	312 \pm 16	27 \pm 1	217 \pm 10	239 \pm 12	H α , β only
RP835	05 29 50.72	-69 10 32.0		B1Ve	-13.62	85 \pm 11	12 \pm 3	258 \pm 3	23 \pm 10	H α , β , [O III]from ambient emission, SP, Bottle shape
RP2177	05 29 51.32	-68 59 15.5		BIIIe	-12.69	350 \pm 18	48 \pm 2	288 \pm 4	305 \pm 15	H α , β , SP
RP785	05 29 55.03	-69 26 53.3	SAB1210	B0V[e]	-13.25	227 \pm 11	57 \pm 2	257 \pm 3	196 \pm 10	H α , β , [O III], SP
RP2210	05 29 56.15	-68 38 50.1		B1V[e]	-12.73	250 \pm 13	26 \pm 1	318 \pm 10	184 \pm 9	H α , β , γ ,[O III], [N II], [S II]
RP974	05 30 00.60	-67 57 30.1		B3Ve	-13.94	202 \pm 10	72 \pm 3	284 \pm 3	181 \pm 9	H α , β
RP786	05 30 01.22	-69 28 09.5	AL243	B3IIe	-13.01	224 \pm 11	27 \pm 1	266 \pm 3	161 \pm 8	H α , β
RP740	05 30 01.79	-69 40 46.6		B3V[e]	-13.27	179 \pm 9	56 \pm 2	275 \pm 2	147 \pm 7	H α , β , [S II], [N II], [O III], SP
RP1083	05 30 14.61	-66 49 12.7		B2IIe	-12.42	395 \pm 20	88 \pm 4	355 \pm 6	398 \pm 20	H α , β
RP546	05 30 19.08	-71 20 04.6	BE74, 75	B5Ve	-12.49	453 \pm 23	56 \pm 2	244 \pm 3	426 \pm 21	H α , β
RP1077	05 30 24.32	-67 14 54.6		B2IIe	-12.93	350 \pm 17	70 \pm 3	323 \pm 5	330 \pm 17	H α , β
RP667	05 30 26.08	-70 15 07.2		A4IVe	-13.77	59 \pm 3	25 \pm 1	275 \pm 2	13 \pm 1	Possible AGB star. Variable.
RP867	05 30 26.65	-69 05 35.8	XMMUJ053115.4-705350	B3Ve	-13.31	312 \pm 16	46 \pm 2	265 \pm 1	268 \pm 13	H α , β
RP1079	05 30 33.33	-66 57 41.9		A0V[e]	-14.07	246 \pm 12	54 \pm 2	287 \pm 2	210 \pm 11	H α + [O III]
RP788	05 30 39.18	-69 25 43.8		F8IIe	-13.89	119 \pm 6	9 \pm 0	270 \pm 1	44 \pm 2	H α , β , ambient emission causing [S II] & [O III], Cepheid known, SP
RP930	05 30 39.36	-68 34 03.6	MACHO77.8160.6	B1.7Ve	-13.17	335 \pm 17	33 \pm 1	280 \pm 2	266 \pm 13	H α , other forbidden lines: [N II], [S II], [O III] but thick nebula in immediate area.
RP2203	05 30 39.43	-68 35 28.5					0			Not observed
RP787	05 30 40.67	-69 25 31.1		B3IIe	-12.69	422 \pm 21	38 \pm 2	276 \pm 6	355 \pm 18	H α , β
RP834	05 30 41.64	-69 11 34.6	MACHO7.8140.15	B1.5IIe	-13.10	99 \pm 5	15 \pm 1	256 \pm 1	38 \pm 2	H α , β , DP centre
RP587	05 30 43.25	-70 25 57.9		B3Ve	-13.11	294 \pm 15	42 \pm 2	256 \pm 4	243 \pm 12	H α , β
RP556	05 30 55.02	-70 45 28.2		B2IIe	-12.18	214 \pm 11	55 \pm 2	255 \pm 3	178 \pm 9	H α , β , SP
RP1075	05 31 04.25	-67 08 22.3	BE74595	B2IIe	-12.89	362 \pm 18	77 \pm 3	315 \pm 5	352 \pm 18	H α , β
RP881	05 31 10.07	-69 05 25.0		B1V[e]	-13.62	68 \pm 3	28 \pm 1	263 \pm 25	22 \pm 1	H α , β , γ , [O III], [N II], [S II]. Within ambient H II which contributes to nebula lines, SP
RP824	05 31 10.86	-69 14 16.9		B8V[e]	-13.77	199 \pm 10	21 \pm 1	270 \pm 3	129 \pm 7	H α , β , [S II], [O III]
RP444	05 31 15.62	-70 53 48.4	BE74595	B0Ie	-13.13	345 \pm 17	14 \pm 1	269 \pm 4	232 \pm 12	H α , β , high mass X-ray binary
RP2209	05 31 16.89	-68 40 05.9		B3III[e]	-13.07	194 \pm 10	11 \pm 0	295 \pm 8	102 \pm 5	H α , β , [O III],[N II],[S II]
RP443	05 31 18.75	-70 54 07.7		B3IVe	-12.51	415 \pm 21	84 \pm 3	268 \pm 4	420 \pm 21	H α , β

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
RP s992	05 31 21.06	-68 31 34.3		B2V[e]	-12.13	32 \pm 2	108 \pm 4	302 \pm 1	5 \pm 0	H α , β , γ , [S II], [N II], [O II], [O III] within compact dense H II cloud. SP
RP s915	05 31 22.11	-68 36 42.0		B2V[e]	-13.24	82 \pm 4	57 \pm 2	275 \pm 2	49 \pm 3	H α , β , [S II], [O III], [O II] in cocoon, SP
RP s2208	05 31 24.25	-68 41 33.6	BE74334		-11.81	374 \pm 19	34 \pm 1	278 \pm 19	310 \pm 16	H α , β , Late-type star characteristics
RP s832	05 31 30.75	-69 11 52.0	MACHO82.8284.23	B3IIIe	-12.84	258 \pm 13	31 \pm 1	265 \pm 4	197 \pm 10	H α , β [O III] from ambient emission
RP s432	05 31 33.11	-70 46 17.9	MACHO7.8260	B3Ve	-13.49	383 \pm 19	26 \pm 1	246 \pm 0	294 \pm 15	H α , H β
RP s507	05 31 36.20	-71 10 42.9		B8Ve	-15.02	95 \pm 5	24 \pm 1	246 \pm 1	44 \pm 2	H α only
RP s825	05 31 36.24	-69 18 45.6		B2III[e]	-13.07	273 \pm 14	73 \pm 3	286 \pm 4	258 \pm 13	H α , β , [S II], [O III], in H II region, SP
RP s938	05 31 40.51	-68 22 44.1		B9Ve	-13.80	96 \pm 5	46 \pm 2	270 \pm 2	58 \pm 3	H α only, forbidden lines [O III], [N II], [S II] due to H II mainly local.
RP s453	05 31 45.97	-70 51 22.9	MACHO14.8259.18	B1V[e]	-13.37	410 \pm 20	29 \pm 1	257 \pm 6	326 \pm 16	H α , β with strong [O III], DP centre
RP s2207	05 31 46.25	-68 33 59.9		F2III[e]	-12.66	300 \pm 15	38 \pm 2	281 \pm 10	242 \pm 12	H α , β , [O III], [N II], [S II]
RP s831	05 31 46.26	-69 09 57.2	L278	B2IIIe	-12.55	279 \pm 14	85 \pm 3	290 \pm 4	272 \pm 14	H α , β , low level [O III] from ambient emission
RP s868	05 31 57.78	-69 06 10.8	AL290	B3IIIe	-12.98	266 \pm 13	36 \pm 1	264 \pm 4	210 \pm 11	H α , β , weak [O III] only 3 σ noise
RP s953	05 32 02.67	-68 11 59.5		B3Ve	-13.71	323 \pm 16	33 \pm 1	270 \pm 4	255 \pm 13	H α only
RP s937	05 32 05.19	-68 12 46.4		A0Ve	-13.93	274 \pm 14	55 \pm 2	287 \pm 3	238 \pm 12	H α
RP s830	05 32 13.66	-69 13 39.6		B5IIIe	-13.09	219 \pm 11	50 \pm 2	291 \pm 3	183 \pm 9	H α , β [O III] from ambient emission, SP
RP s975	05 32 14.81	-68 10 25.6		B2Ve	-13.93	182 \pm 9	35 \pm 1	273 \pm 2	132 \pm 7	H α only
RP s912	05 32 15.68	-68 40 14.5		B3V[e]	-13.28	111 \pm 6	83 \pm 3	276 \pm 2	89 \pm 4	H α , β , [N II], [O II], [O III], [S II], SP
RP s448	05 32 17.29	-70 47 34.0		B2Ve	-12.81	267 \pm 13	41 \pm 2	215 \pm 6	217 \pm 11	H α , β , DP centre
RP s935	05 32 18.75	-68 17 30.9		B3Ve	-13.51	242 \pm 12	97 \pm 4	302 \pm 3	238 \pm 12	H α , β
RP s914	05 32 18.77	-68 41 59.2		B2V[e]	-13.25	58 \pm 3	48 \pm 2	254 \pm 1	20 \pm 1	H α , β , [O II], [O III], [N II], [S II], DP centre
RP s936	05 32 22.20	-68 17 33.8		B3Ve	-14.21	498 \pm 25	41 \pm 2	310 \pm 20	437 \pm 22	H α only.
RP s911	05 32 26.47	-68 39 03.9		B1V[e]	-13.54	183 \pm 9	106 \pm 4	285 \pm 2	178 \pm 9	H α , β , [N II], [O II], [O III], [S II], SP
RP s1014	05 32 26.98	-70 47 44.3		B8Ve	-14.46	267 \pm 13	34 \pm 1	253 \pm 3	205 \pm 10	H α only, DP V>R
RP s447	05 32 27.03	-70 47 44.0		B3Ve	-13.57	409 \pm 20	49 \pm 2	227 \pm 6	371 \pm 19	H α only
RP s449	05 32 28.35	-70 47 28.6		B2V[e]	-14.93	464 \pm 23	46 \pm 2	252 \pm 3	415 \pm 21	H α , β , [O II], [O III], [N II], [S II]
RP s532	05 32 30.10	-71 13 30.2		B2V[e]	-12.65	443 \pm 22	49 \pm 2	252 \pm 2	395 \pm 20	H α , β , [N II], [S II]
RP s790	05 32 33.61	-69 24 56.0		F2III[e]	-13.68	117 \pm 6	20 \pm 1	269 \pm 18	57 \pm 3	H α , β , [O II], [O III], [N II], [S II]
RP s502	05 32 34.68	-71 06 49.8	MACHO14.8497.6	B3Ve	-13.19	208 \pm 10	25 \pm 1	229 \pm 2	141 \pm 7	H α , β
RP s682	05 32 41.08	-70 09 51.6		B2Ve	-14.13	46 \pm 2	36 \pm 1	262 \pm 1	6 \pm 0	in diffuse emission 8 arcsec dia.
RP s773	05 32 50.20	-69 35 35.6		B3Ve	-13.43	436 \pm 22	21 \pm 1	289 \pm 26	330 \pm 17	H α , β
RP s826	05 33 02.38	-69 16 55.9	BE74352	B0.5IIIe	-12.50	294 \pm 15	24 \pm 1	274 \pm 3	217 \pm 11	H α , β , forbidden lines at <3 σ noise are due to ambient emission
RP s744	05 33 05.02	-69 38 47.3	MACHO81.8519.32	B1IIIe	-13.10	429 \pm 21	49 \pm 2	294 \pm 4	381 \pm 19	H α , β
RP s1102	05 33 05.55	-67 37 15.6		B0Ie	-12.62	349 \pm 17	35 \pm 1	280 \pm 15	288 \pm 14	H α , β , γ , weak [O III]
RP s1101	05 33 06.23	-67 36 49.2		B5IIIe	-12.54	227 \pm 11	72 \pm 3	287 \pm 3	208 \pm 10	H α , β , Weak forbidden lines mainly due to ambient H II emission
RP s827	05 33 07.23	-69 15 27.7		B1Ve	-13.47	286 \pm 14	88 \pm 4	283 \pm 4	279 \pm 14	H α , β [O III] from ambient emission, SP
RP s1001	05 33 07.49	-68 47 55.1		F8IV[e]	-13.02	285 \pm 14	54 \pm 2	243 \pm 2	248 \pm 12	H α , β , γ , [S II], [N II], [O II], [O III], SP
RP s1098	05 33 07.61	-67 18 05.5	AL 312	B0.5IIIe	-12.85	179 \pm 9	50 \pm 2	280 \pm 3	143 \pm 7	H α , β , γ , SP
RP s791	05 33 07.62	-69 29 46.1			-13.96	220 \pm 11	52 \pm 2	260 \pm 19	183 \pm 9	weak
RP s1100	05 33 22.24	-67 38 48.5		B9V[e]	-13.36	197 \pm 10	75 \pm 3	301 \pm 3	177 \pm 9	H α , β , γ , [S II], [N II], [O II]
RP s908	05 33 23.24	-68 39 34.8		B1V[e]	-14.03	390 \pm 19	54 \pm 2	334 \pm 21	352 \pm 18	H α , β , [O III], [O II], [N II], [S II], DP centre
RP s529	05 33 24.93	-71 11 38.9		B5Ve	-14.16	211 \pm 11	31 \pm 1	301 \pm 2	154 \pm 8	H α only
RP s829	05 33 25.56	-67 24 11.7		B1Ve	-13.19	286 \pm 14	35 \pm 1	254 \pm 4	228 \pm 11	H α , β [O III] from ambient emission
RP s697	05 33 29.21	-69 52 33.0		B1V[e]	-13.43	345 \pm 17	64 \pm 3	217 \pm 11	325 \pm 16	H α , β , [S II], [N II], [O II]
RP s698	05 33 29.89	-69 52 28.8		B3IIIe	-12.91	237 \pm 12	46 \pm 2	322 \pm 15	195 \pm 10	weak
RP s1106	05 33 33.12	-67 24 54.0		O7V[e]	-13.13	90 \pm 4	8 \pm 0	298 \pm 18	21 \pm 1	H α , β , [O III], [N II], [S II]
RP s1105	05 33 37.50	-67 25 39.3	GRV0533-6727	A0III[e]	-12.91	134 \pm 7	15 \pm 1	296 \pm 2	65 \pm 3	H α , β , γ , [S II], [N II], [O II], [O III]
RP s828	05 33 40.24	-69 12 50.6		F2III[e]	-12.79	341 \pm 17	44 \pm 2	252 \pm 40	296 \pm 15	H α , β , γ , [S II], [N II], [O II], [O III]
RP s909	05 33 44.06	-68 40 15.2		B0.5IIIe	-12.07	366 \pm 18	64 \pm 3	296 \pm 5	347 \pm 17	H α , β , γ , δ , SP
RP s574	05 33 44.39	-70 33 21.2		B1Ve	-13.54	280 \pm 14	31 \pm 1	251 \pm 3	217 \pm 11	H α , β
RP s495	05 34 26.46	-71 16 31.2		B2Ve	-12.83	366 \pm 18	36 \pm 1	232 \pm 4	303 \pm 15	H α , β
RP s934	05 34 39.65	-68 21 55.7		B2Ve	-13.09	111 \pm 6	39 \pm 2	280 \pm 2	69 \pm 4	H α , β , forbidden lines from 6 arcsec radius disk surround star.
RP s500	05 34 47.82	-71 05 48.9		B2Ve	-12.65	511 \pm 26	45 \pm 2	252 \pm 5	461 \pm 23	H α , β , HeI absorption
RP s419	05 34 52.63	-70 45 45.8	MACHO11.8865.7	B1Ve	-13.24	182 \pm 9	52 \pm 2	258 \pm 3	146 \pm 7	H α , β only
RP s471	05 35 05.47	-70 51 14.8		B3Ve	-14.08	254 \pm 13	16 \pm 1	264 \pm 5	166 \pm 8	H α only. Strong HeI lines
RP s696	05 35 13.68	-69 49 46.9	SAB1373	B1IIIe	-13.07	268 \pm 13	30 \pm 1	289 \pm 3	200 \pm 10	H α , β , SP
RP s362	05 35 29.44	-66 50 33.8		A3V[e]	-14.10	378 \pm 19	42 \pm 2	288 \pm 37	322 \pm 16	H α , β , [S II], [N II], [O II]
RP s326	05 35 30.21	-67 38 05.9		B1.7Ve	-13.55	101 \pm 5	53 \pm 2	308 \pm 15	65 \pm 3	faint, ambient H II
RP s304	05 35 35.23	-67 40 22.1	AL345	B0.5IIIe	-11.04	280 \pm 14	59 \pm 2	302 \pm 4	250 \pm 13	H α , β , γ

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
RP s364	05 35 49.19	-66 51 26.0		B1.5Ve	-13.86	329 \pm 16	28 \pm 1	302 \pm 5	254 \pm 13	H α
RP s365	05 35 53.94	-66 52 32.3		F8Ve	-13.58	399 \pm 20	65 \pm 3	262 \pm 6	382 \pm 19	H α , β , some local faint H II emission
RP s368	05 35 55.73	-66 51 08.6		B2IVe	-13.33	271 \pm 14	28 \pm 1	335 \pm 4	203 \pm 10	H α , β
RP s369	05 35 57.84	-66 50 53.7	AL350	B7IIIe	-13.56	281 \pm 14	30 \pm 1	282 \pm 4	217 \pm 11	H α , β
RP s1033	05 36 04.27	-67 55 37.0	BE74385	B2IVe	-11.05	263 \pm 13	54 \pm 2	289 \pm 4	227 \pm 11	H α , β , LBV poss
RP s487	05 36 04.46	-70 51 01.4	BE74605	B2IIIe	-12.89	394 \pm 20	49 \pm 2	223 \pm 16	347 \pm 17	H α , β , γ
RP s684	05 36 09.68	-70 06 08.0	SAB1386	B7Ve	-13.59	464 \pm 23	34 \pm 1	224 \pm 5	394 \pm 20	H α only
RP s1005	05 36 16.32	-70 26 21.9	MACHO11.9112.61	B3V[e]	-13.18	223 \pm 11	110 \pm 4	322 \pm 3	223 \pm 11	H α , β , [O III], SP
RP s531	05 36 16.96	-71 09 41.9		B2Ve	-13.98	524 \pm 26	41 \pm 2	329 \pm 2	461 \pm 23	H α , β ,
RP s348	05 36 28.63	-66 53 02.5	AL359	B5IIIe	-12.46	509 \pm 25	67 \pm 3	312 \pm 9	497 \pm 25	H α , β
RP s370	05 36 33.18	-66 51 18.6		B1Ve	-13.65	379 \pm 19	45 \pm 2	286 \pm 5	332 \pm 17	H α , β
RP s639	05 36 37.12	-69 22 09.4		B3IIIe	-12.87	135 \pm 7	40 \pm 2	245 \pm 3	92 \pm 5	H α , β [O III] is ambient emission
RP s557	05 36 39.75	-70 44 37.4		B3Ve	-14.18	433 \pm 22	45 \pm 2	238 \pm 4	385 \pm 19	H α , β ,
RP s258	05 36 43.71	-69 36 44.6	MACHO81.9125.21	B3III[e]	-12.87	180 \pm 9	32 \pm 1	274 \pm 3	126 \pm 6	H α , β , γ , [O III], [O II], [N II], [S II]. Within H II region, SP
RP s259	05 36 48.63	-69 26 44.6		B3V[e]	-13.54	218 \pm 11	62 \pm 2	333 \pm 18	187 \pm 9	H α , β , γ , [O III], [O II], [N II], [S II]
RP s231	05 36 49.38	-69 23 55.2		B2V[e]	-13.09	246 \pm 12	53 \pm 2	265 \pm 22	210 \pm 11	H α , β , γ , [O III], [O II], [N II], [S II]
RP s2163	05 36 54.13	-66 30 04.1		B3Ve	-13.59	176 \pm 9	62 \pm 2	320 \pm 7	145 \pm 7	H α , β
RP s330	05 36 57.68	-67 34 02.6		B1Ve	-13.83	166 \pm 8	15 \pm 1	291 \pm 2	91 \pm 5	H α , (pc on H β), faint, ambient H II
RP s284	05 37 12.85	-68 37 11.8		B1Ve	-12.89	465 \pm 23	74 \pm 3	265 \pm 15	463 \pm 23	H α , β
RP s353	05 37 14.27	-66 26 59.2		B3IV[e]	-13.08	212 \pm 11	91 \pm 4	263 \pm 5	199 \pm 10	H α , β , γ , [O III], [O II], [N II], [S II]
RP s352	05 37 14.60	-66 26 52.6		B1V[e]	-12.80	38 \pm 2	129 \pm 5	291 \pm 1	13 \pm 1	strong [S II] + [N II] but low [O III]. Strong [O II]
RP s27	05 37 25.41	-70 30 47.9		A4Ve	-13.58	166 \pm 8	136 \pm 5	254 \pm 3	168 \pm 8	H α , β , DP V>R
RP s298	05 37 28.44	-68 12 34.7		A2IVe	-13.09	518 \pm 26	101 \pm 4	278 \pm 8	546 \pm 27	H α , β
RP s257	05 37 35.37	-69 34 59.5	LI-SMC302	B2IIIe	-12.11	282 \pm 14	172 \pm 7	268 \pm 5	315 \pm 16	H α , β , Low level [S II], [O III] probably ambient
RP s29	05 37 38.98	-70 32 46.3		B1.7Ve	-13.50	555 \pm 28	31 \pm 1	271 \pm 65	466 \pm 23	H α , β
RP s1043	05 37 40.59	-67 31 37.1		B1Ve	-14.01	111 \pm 6	8 \pm 0	293 \pm 1	36 \pm 2	H α only. Centre of faint elliptical emission 20.7 x 42 arcsec
RP s283	05 37 48.30	-68 39 54.6		B3V[e]	-13.16	496 \pm 25	41 \pm 2	292 \pm 19	435 \pm 22	H α , β , γ , [O III], [N II], [S II], DP V>R
RP s372	05 37 50.31	-66 55 40.2		B4IIIe	-12.98	394 \pm 20	41 \pm 2	306 \pm 5	338 \pm 17	H α , β
RP s285	05 37 58.73	-68 33 39.2	BE74411	B2IVe	-12.50	352 \pm 18	38 \pm 2	261 \pm 4	290 \pm 15	H α , β
RP s226	05 38 03.07	-69 31 58.9		B1.7V[e]	-12.85	49 \pm 2	25 \pm 1	267 \pm 2	4 \pm 0	H α , β , forbidden lines from ambient emission
RP s81	05 38 03.78	-70 50 28.3		B0IVe	-12.70	307 \pm 15	27 \pm 1	251 \pm 18	234 \pm 12	H α , β
RP s634	05 38 04.67	-69 59 18.4		B6Ve	-13.54	226 \pm 11	96 \pm 4	242 \pm 3	220 \pm 11	H α , β , SP
RP s2198	05 38 07.83	-70 01 37.8								Not observed
RP s338	05 38 12.92	-67 18 27.8		B2Ve	-13.81	205 \pm 10	42 \pm 2	303 \pm 2	159 \pm 8	H α , β , low levels (2 σ noise) due to faint ambient emission.
RP s337	05 38 15.55	-67 15 49.2		B3IIIe	-13.03	276 \pm 14	60 \pm 2	267 \pm 4	246 \pm 12	H α , β
RP s224	05 38 17.32	-69 32 05.0		B0.5I[e]	-12.41	141 \pm 7	41 \pm 2	260 \pm 3	98 \pm 5	H α , β , [S II], [N II], [O III], [O II]
RP s335	05 38 17.82	-67 34 39.8		B2IIIe	-13.03	240 \pm 12	46 \pm 2	256 \pm 3	198 \pm 10	H α , β
RP s301	05 38 19.82	-67 45 01.5		B1V[e]	-13.36	135 \pm 7	76 \pm 3	314 \pm 2	111 \pm 6	H α , β , [S II], [N II], [O II]
RP s1952	05 38 22.79	-71 15 13.5		B9Ve	-14.25	511 \pm 26	42 \pm 2	201 \pm 1	449 \pm 23	H α only
RP s91	05 38 22.87	-70 18 01.5		B1Ve	-14.32	335 \pm 17	26 \pm 1	233 \pm 2	252 \pm 13	H α only
RP s146	05 38 26.35	-70 10 50.0		B2Ve	-14.02	534 \pm 27	51 \pm 2	223 \pm 2	496 \pm 25	H α only
RP s290	05 38 40.83	-68 24 00.7		BVp[e]	-11.92	148 \pm 7	124 \pm 5	267 \pm 3	143 \pm 7	H α , β , [O III]
RP s311	05 38 44.16	-68 43 53.9		B1IVe	-12.58	264 \pm 13	53 \pm 2	317 \pm 4	227 \pm 11	H α , β , forbidden lines due top strong ambient emission
RP s325	05 38 49.92	-67 32 04.5		B2Ve	-13.73	285 \pm 14	29 \pm 1	317 \pm 4	215 \pm 11	H α , β
RP s256	05 38 51.35	-69 44 51.1		B0.5Ve	-13.47	48 \pm 2	24 \pm 1	267 \pm 1	4 \pm 0	H α , β , [S II], [O III], large halo proably associated.
RP s248	05 38 51.39	-69 21 42.5		B2V[e]	-13.10	151 \pm 8	56 \pm 2	264 \pm 2	119 \pm 6	H α , β , γ , [S II], [N II], [O II], [O III] at least, SP 50% forbidden lines from ambient emission
RP s339	05 38 55.12	-67 19 31.7		B1Ve	-12.38	346 \pm 17	57 \pm 2	340 \pm 4	317 \pm 16	H α , β
RP s104	05 39 03.10	-70 23 43.9		B1V[e]	-12.80	198 \pm 10	38 \pm 2	241 \pm 3	147 \pm 7	H α , [N II] and [S II]
RP s1034	05 39 12.67	-67 42 49.9		B3Ve	-12.72	310 \pm 16	50 \pm 2	286 \pm 4	273 \pm 14	H α
RP s66	05 39 14.02	-70 45 03.7		B1Ve	-13.66	226 \pm 11	31 \pm 1	245 \pm 2	168 \pm 8	H α , β
RP s340	05 39 16.59	-67 23 42.9	BE74141	B5IIIe	-12.42	289 \pm 14	59 \pm 2	304 \pm 4	260 \pm 13	H α , β
RP s391	05 39 19.80	-67 08 55.7		B3Ve	-12.83	249 \pm 12	70 \pm 3	325 \pm 2	225 \pm 11	H α , β
RP s286	05 39 25.87	-68 33 16.2	BE74426	B1Ve	-13.48	458 \pm 23	31 \pm 1	253 \pm 3	378 \pm 19	H α , β , γ
RP s390	05 39 36.81	-67 08 33.6		B3IIIe	-13.92	244 \pm 12	35 \pm 1	295 \pm 2	190 \pm 10	H α , [S II]
RP s92	05 39 37.63	-70 15 43.9	SAB507	B0IIIe	-13.12	357 \pm 18	104 \pm 4	269 \pm 6	366 \pm 18	H α , β
RP s141	05 39 40.03	-70 10 16.7		B1Ve	-14.19	143 \pm 11	30 \pm 1	240 \pm 2	93 \pm 5	H α , Bottle shape
RP s632	05 39 44.61	-70 01 00.9		B1Ve	-13.87	102 \pm 24	11 \pm 2	262 \pm 5	36 \pm 21	H α , β , SP, Bottle shape
RP s341	05 39 48.49	-67 23 23.5		B2Ve	-13.28	184 \pm 9	41 \pm 2	295 \pm 3	139 \pm 7	H α , β

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
RP s83	05 40 04.53	-70 39 44.9	SAB1449	B0IIe	-13.38	108 \pm 5	16 \pm 1	255 \pm 2	48 \pm 2	H α , β , Forbidden lines due to surrounding thick H II disk 16arcsec radius
RP s138	05 40 10.00	-70 09 20.1		B3Ve	-13.50	62 \pm 3	22 \pm 1	270 \pm 1	14 \pm 1	H α only
RP s139	05 40 12.00	-70 09 15.1		F0III[e]	-13.84	411 \pm 21	43 \pm 2	314 \pm 5	354 \pm 18	H α , [S II], SP
RP s625	05 40 15.33	-70 46 13.2		B1Ve	-13.51	543 \pm 27	44 \pm 2	221 \pm 9	493 \pm 25	H α , β
RP s288	05 40 19.60	-68 29 19.9			-13.42	515 \pm 26	37 \pm 1		441 \pm 22	H α , β
RP s21	05 40 19.65	-70 13 47.3		A6IVe	-14.98	50 \pm 2	114 \pm 5	220 \pm 2	25 \pm 1	Low emission levels at time of observation
RP s160	05 40 24.80	-69 57 15.5		B8Ie	-12.51	311 \pm 16	37 \pm 1	268 \pm 2	252 \pm 13	H α , ([S II] from large H II disk R=18 arcsec)
RP s387	05 40 25.58	-67 07 55.6		B3Ve	-13.35	271 \pm 14	40 \pm 2	310 \pm 4	221 \pm 11	H α , β
RP s2197	05 40 26.74	-70 07 18.5			-14.25	177 \pm 9	8 \pm 0		82 \pm 4	H α , DP R>V
RP s1029	05 40 26.95	-68 09 40.3		A3Ve	-13.68	281 \pm 14	73 \pm 3	261 \pm 4	266 \pm 13	H α , β
RP s629	05 40 37.20	-70 09 09.8		B1V[e]	-13.26	74 \pm 4	26 \pm 1	241 \pm 2	26 \pm 1	H α , H β absorbed, bright emission extending 6 arcsec around star with [S II], [N II][O II]
RP s239	05 40 39.38	-69 15 29.8	BE74441	B0.5IIIe	-12.57	264 \pm 13	68 \pm 3	260 \pm 4	241 \pm 12	Pcyg on H α , β
RP s1032	05 40 49.76	-67 57 22.5		B1.7V[e]	-13.93	195 \pm 10	40 \pm 2	301 \pm 2	149 \pm 8	H α , β , [S II], [O II]
RP s236	05 40 50.29	-69 21 26.3	BE74443	B0V[e]	-13.14	118 \pm 6	49 \pm 2	254 \pm 2	79 \pm 4	H α , β , [S II], [N II], [O II], [O III]
RP s115	05 40 50.99	-70 36 37.9		B3IIIe	-14.20	281 \pm 14	5 \pm 0	247 \pm 1	136 \pm 7	H α , low level [S II]
RP s306	05 40 51.97	-68 55 09.9		B0.5III[e]	-12.58	122 \pm 6	37 \pm 1	252 \pm 2	76 \pm 4	H α , β , γ , [S II], [N II], [O II], [O III] in H II
RP s240	05 40 55.46	-69 14 09.9		B0.5V[e]	-13.06	159 \pm 8	40 \pm 2	259 \pm 17	115 \pm 6	H α , β , [S II], [N II], [O II], [O III]
RP s238	05 40 55.93	-69 16 14.5	BE74444	B0.5III[e]	-12.10	293 \pm 15	116 \pm 5	246 \pm 28	304 \pm 15	H α , β , [S II]
RP s237	05 41 00.76	-69 22 05.1	BE74443	B1V[e]	-13.01	152 \pm 8	35 \pm 1	251 \pm 3	104 \pm 5	H α , β , [S II], [N II], [O II], [O III]
RP s96	05 41 04.59	-70 19 58.4	SAB973	B8V[e]	-13.87	374 \pm 19	35 \pm 1	252 \pm 1	310 \pm 16	H α , β , [S II], [N II]
RP s113	05 41 05.19	-70 32 31.0		B1Ie	-13.77	206 \pm 10	29 \pm 1	228 \pm 1	145 \pm 7	H α only
RP s56	05 41 10.12	-70 53 38.7		B1Ie	-13.24	135 \pm 7	5 \pm 0	244 \pm 99	45 \pm 2	H α only
RP s95	05 41 13.73	-70 23 24.7		B9V[e]	-13.96	84 \pm 4	72 \pm 3	254 \pm 16	56 \pm 3	H α , β , [S II], [N II], [O II], [O III](diffuse emission at location)
RP s159	05 41 15.29	-69 58 10.3		B3IIIe	-13.32	347 \pm 17	23 \pm 1	255 \pm 2	255 \pm 13	H α , [S II] centre of large H II disk 22 arcsec radius
RP s343	05 41 20.97	-67 22 02.9		B1.5Ve	-14.01	358 \pm 18	56 \pm 2	315 \pm 4	321 \pm 16	H α , β
RP s1022	05 41 22.94	-68 36 24.9		F0IIe	-12.71	482 \pm 24	95 \pm 4	292 \pm 12	506 \pm 25	H α , β
RP s1036	05 41 30.41	-68 53 44.0		B2IIIe	-12.21	342 \pm 17	60 \pm 2	268 \pm 4	313 \pm 16	H α , β
RP s20	05 41 31.63	-70 15 31.4		B1.7Ve	-13.15	241 \pm 12	40 \pm 2	249 \pm 3	192 \pm 10	H α on star
RP s260	05 41 34.57	-68 56 02.7		F8V[e]	-14.96	148 \pm 7	59 \pm 2	257 \pm 2	116 \pm 6	H α , β , [S II], [N II], [O II], [O III]
RP s355	05 41 36.91	-66 41 57.3		B5IIIe	-13.05	190 \pm 9	28 \pm 1	276 \pm 3	130 \pm 7	H α , β with Pcyg profile.
RP s63	05 41 40.07	-70 43 55.4		B2Ve	-13.47	541 \pm 27	56 \pm 2	262 \pm 6	516 \pm 26	H α , β , continuum very weak
RP s1963	05 41 42.41	-71 21 18.5		B0IVe	-11.44	75 \pm 4	119 \pm 5	241 \pm 2	57 \pm 3	H α , β , γ , δ , ϵ connected to H II region to north
RP s1027	05 41 43.34	-68 14 48.7		B1Ve	-13.55	284 \pm 14	70 \pm 3	259 \pm 4	262 \pm 13	H α , β
RP s300	05 41 45.26	-67 43 41.2	AL395	B0IVe	-12.95	370 \pm 19	67 \pm 3	293 \pm 5	352 \pm 18	H α , β
RP s282	05 41 45.42	-68 42 30.4		B3IIIe	-12.76	221 \pm 11	51 \pm 2	266 \pm 3	184 \pm 9	H α , β
RP s1023	05 41 45.82	-68 34 32.0	BE74451	A5Ve	-13.94	537 \pm 27	31 \pm 1	260 \pm 3	450 \pm 23	H α , β
RP s377	05 41 49.44	-66 58 20.1		A3Ve	-14.07	194 \pm 10	43 \pm 2	261 \pm 15	148 \pm 7	H α
RP s276	05 41 57.35	-68 47 46.8		B1.7Ve	-13.35	341 \pm 17	57 \pm 2	290 \pm 4	313 \pm 16	H α , β
RP s354	05 41 58.11	-67 30 39.0		B1Ve	-13.09	379 \pm 19	56 \pm 2	247 \pm 1	351 \pm 18	H α , H β , H γ
RP s124	05 42 03.05	-70 44 21.9	SAB678	B0.5IIIe	-13.19	174 \pm 9	40 \pm 2	254 \pm 3	129 \pm 7	H α , β , γ
RP s280	05 42 08.95	-68 41 50.8		B2IIIe	-12.50	326 \pm 16	63 \pm 3	293 \pm 5	298 \pm 15	H α , β
RP s386	05 42 15.04	-67 07 25.9		B1Ve	-11.75	322 \pm 16	56 \pm 2	307 \pm 3	293 \pm 15	H α , β Pcyg profile on both.
RP s1020	05 42 18.08	-68 37 51.4		B1Ve	-13.15	550 \pm 28	60 \pm 2	286 \pm 8	526 \pm 26	H α , β , γ
RP s1112	05 42 19.59	-67 18 58.0		B1Ve	-13.47	536 \pm 27	86 \pm 3	310 \pm 2	552 \pm 28	H α , β
RP s385	05 42 25.60	-67 08 42.0		B1Ve	-13.68	279 \pm 14	37 \pm 1	299 \pm 3	223 \pm 11	H α only
RP s293	05 42 27.21	-68 17 46.0		B1Ve	-12.76	356 \pm 18	144 \pm 6	334 \pm 5	396 \pm 20	H α , β
RP s1949	05 42 28.75	-68 16 48.2		B0Ve	-13.85	242 \pm 12	78 \pm 3	256 \pm 4	225 \pm 11	H α . At outer rim of globular cluster
RP s11	05 42 47.38	-70 28 48.9		B0IIIe	-12.49	364 \pm 18	65 \pm 3	251 \pm 4	345 \pm 17	H α , β
RP s1026	05 42 47.40	-68 32 57.4		F0Ve	-14.05	415 \pm 21	50 \pm 2	299 \pm 7	378 \pm 19	H α
RP s249	05 42 57.60	-69 16 32.9		B1.7V[e]	-12.19	100 \pm 5	99 \pm 4	270 \pm 1	80 \pm 4	H α , β , γ [S II], [N II], [O II], [O III]. Very strong emission lines
RP s307	05 43 12.41	-67 50 53.4		B1.5V[e]	-13.25	189 \pm 9	28 \pm 1	305 \pm 19	130 \pm 7	H α , β , [S II], [N II], [O II], [O III]
RP s161	05 43 14.37	-69 59 10.4		B1.7V[e]	-13.21	320 \pm 16	43 \pm 2	278 \pm 1	268 \pm 13	H α , β , [S II], [N II], [O II]
RP s309	05 43 20.77	-67 49 44.6		B1.7V[e]	-12.99	181 \pm 9	35 \pm 1	304 \pm 2	131 \pm 7	H α , β , [S II], [N II], [O II], [O III]
RP s204	05 43 51.09	-69 05 54.9	SHV0544120 -690705	B2V[e]	-13.25	137 \pm 7	11 \pm 0	280 \pm 2	62 \pm 3	H α , β , [S II], [N II], [O II], [O III]
RP s287	05 44 12.00	-68 27 27.1	BE74468	B0Ve	-12.87	330 \pm 16	66 \pm 3	270 \pm 4	310 \pm 16	H α , β
RP s322	05 44 14.25	-67 29 59.9		B2IVe	-13.18	305 \pm 15	69 \pm 3	307 \pm 4	283 \pm 14	H α , β
RP s321	05 44 20.90	-67 25 33.8		B3IVe	-12.58			295 \pm 1		H α , β , pcyg on H β , extended diffuse emission

RP Object	RA J2000	DEC J2000	Other Catalog Reference	Spec Type	Log F H α	FWHM H α km/s	EW H α Å	Vel. (helio) km/s	$v \sin i$ km/s	Comments
RPs274	05 44 41.56	-68 51 29.3	IRAS - P.C05448-6720	B1Ve	-12.63	527 \pm 26	61 \pm 2	259 \pm 6	502 \pm 25	H α , β
RPs344	05 44 47.54	-67 19 33.8		B1.5V[e]	-13.27	95 \pm 5	160 \pm 6	294 \pm 2	87 \pm 4	H α , β , [S II], [N II], [O III]
RPs131	05 44 49.65	-70 08 26.1			-13.49	212 \pm 11	19 \pm 1	262 \pm 11	136 \pm 7	weak continuum, H α , β , [O III]
RPs383	05 45 08.11	-67 05 58.1		B2Ve	-13.25	293 \pm 15	45 \pm 2	306 \pm 4	250 \pm 13	H α , β
RPs244	05 45 19.02	-69 48 02.4	BE74474	B3Ve	-13.65	330 \pm 16	43 \pm 2	243 \pm 24	277 \pm 14	H α , β , ([S II] ambient)
RPs174	05 45 24.39	-69 50 09.8		B3V[e]	-13.90	107 \pm 5	90 \pm 4	254 \pm 4	84 \pm 4	H α , β , [S II], [N II], [O II], Very low [O III]
RPs255	05 45 29.40	-69 22 37.3		B0.5IIIe	-12.28	136 \pm 7	46 \pm 2	249 \pm 3	97 \pm 5	H α , β , γ
RPs294	05 45 29.63	-68 11 45.8		B0.5IIIe	-11.88	308 \pm 15	143 \pm 6	340 \pm 4	339 \pm 17	H α , β , γ
RPs262	05 45 44.23	-69 14 05.1		B2IVe	-12.55	230 \pm 11	122 \pm 5	274 \pm 3	238 \pm 12	H α , β , own emission but within H II region
RPs636	05 45 48.11	-69 38 32.6		B5III[e]	-13.66	349 \pm 17	50 \pm 2	263 \pm 4	312 \pm 16	H α , β , [N II], [O II], [O III], Very low [S II]
RPs261	05 45 58.15	-69 08 57.5		B0.5III[e]	-12.50	112 \pm 6	30 \pm 1	231 \pm 19	62 \pm 3	H α , β , γ , [S II], [N II], [O II], [O III] dense emission halo + some diffuse in area
RPs305	05 46 01.62	-67 35 54.9		B5IIIe	-12.54	270 \pm 13	56 \pm 2	265 \pm 157	233 \pm 12	H α
RPs1948	05 46 04.82	-68 27 41.1		B3IIIe	-13.63	460 \pm 23	31 \pm 1	342 \pm 4	380 \pm 19	H α , central star of faint diffuse emission 20 arcsec radius
RPs1017	05 46 27.15	-68 43 15.9		B1Ve	-12.82	388 \pm 19	49 \pm 2	282 \pm 2	350 \pm 18	H α , β
RPs1041	05 47 19.53	-70 04 31.4		B3Ve	-14.08	296 \pm 15	17 \pm 1	244 \pm 1	199 \pm 10	H α , [S II] from faint, extended emission
RPs1947	05 47 29.74	-68 39 46.0		B3IIIe	-12.75	229 \pm 11	38 \pm 2	273 \pm 3	176 \pm 9	H α , β
RPs1950	05 48 32.75	-68 13 10.8		B0Ve	-13.67	439 \pm 22	116 \pm 5	306 \pm 5	471 \pm 24	H α , β
RPs211	05 48 40.08	-69 12 00.8		B5IIIe	-12.64	301 \pm 15	42 \pm 2	255 \pm 5	250 \pm 13	H α , β
RPs1035	05 48 43.48	-67 36 10.6		B8III[e]	-10.03	229 \pm 11	47 \pm 2	284 \pm 3	187 \pm 9	H α , β , γ , δ , ϵ , [S II], [N II], [O III], LBV poss, SP
RPs210	05 49 10.14	-69 11 03.9		B2Ve	-12.87	265 \pm 13	37 \pm 1	248 \pm 4	209 \pm 10	H α , β
RPs633	05 49 41.16	-70 01 36.3		B5IIIe	-13.38	98 \pm 5	22 \pm 1	209 \pm 1	44 \pm 2	H α , β , [O III] from triangular-shaped H II region to N and west
RPs17	05 50 08.52	-70 09 49.4		B1.7Ve	-13.21	200 \pm 10	58 \pm 2	219 \pm 3	168 \pm 8	H α , β , some low [O III] from diffuse local H II

notes: AL: Andrews A.D., Lindsay E.M., (1964); AGPRS: Melchior A.-L., Hughes S.M.G., Guibert J., (2000); BE74: Bohannon B., Epps H. W., (1974); FAUST: Bowyer S., Sasseen T.P., Wu X., Lampton M., (1995); GRV: Reid N., Glass I.S., Catchpole R.M., (1988); HD: Draper H., (1924); IRAS: <http://irsa.ipac.caltech.edu/IRASdocs/iras.html>; KDM: Kontizas E., Dapergolas A., Morgan D. H., Kontizas M., (2001); L63: Lindsay E.M., (1963); LI: Schwering P.B.W., (1989); MACHO: Keller S.C., Bessell M.S., Cook K. H., Geha M., Syphers D., (2002); S: Henize K.G., (1956); SAB: Sabogal B.E., Mennickent R.E., Pietrzynski G., Gieren W., (2005); SV (DV, HV): Butler C.J., Wayman P.A., (1974); SHV: Hughes S.M.G., (1989); XMMU: Lumb D.H., Guainazzi M., Gondoin P., (2001); 2MASS: Skrutskie M.F. et al. (2006)

2 APPENDIX: TABLE 2

Compiled magnitude data for all hot emission-line stars in the LMC UKST H α survey. Please refer to section 15 for more detailed information. Column 1 gives the Reid Parker (RPs) number for the star (s). Columns 2 and 3 give the RA and Dec in J2000 coordinates. Column 4 gives the published GSC2.2 catalogue number where a star has been previously identified. Column 5 gives the distance between our position and the GSC2.2 position. Column 6 gives Ogle Catalog reference. Column 7 gives the reference number from the USNO catalogue provided by ESO. Column 8 gives the distance between our position and that provided by USNO. Column 9 gives the PA as provided by USNO. Columns 10-12 give the B magnitudes from Ogle, Super Cosmos (SC) and USNO respectively. Columns 13 and 14 give the V magnitudes from Ogle and SC respectively. Columns 15 and 16 give the I magnitudes from OGLE and SC respectively and columns 17 and 18 give the R magnitudes from SC and USNO respectively.

RP Object	RA J2000	DEC J2000	GSC2.2 Catalog Reference	d mins GSC2.2	OGLE Catalog Reference	USNO Catalog Reference	d mins USNO	PA deg.	B Mag Ogle	B Mag SC	B Mag USNO	V Mag GSC2.2	V Mag OGLE	I Mag SC	I Mag OGLE	R Mag SC	R Mag USNO
RP1741	04 52 55.41	-69 10 02.30	S013202239559	0.02						18.279				16.274		17.318	
RP1647	04 53 01.03	-70 42 12.33	S0132020114	0.01						14.561		16.53				13.55	
RP1701	04 53 02.01	-69 47 04.14	S013202222732	0.01		U0150-02229476	0.006	289		17.306	18.1	17.38		16.003		16.159	16.9
RP1699	04 53 06.86	-69 57 24.74	S013202215240	0.01		U0150-02231025	0.01	333		16.067	16.1	16.98		15.711		15.424	15.5
RP1671	04 53 25.43	-70 35 39.75	S013202078	0.01						12.896		12.91		12.939		11.915	
RP1778	04 53 43.26	-69 54 02.35	S013202217709	0.02		U0150-02242441	0.015	342		16.613	17	16.5		15.402		15.551	16.1
RP1715	04 53 54.12	-69 29 24.90	S013202232919	0.01						17.165		17.6		15.966		16.437	
RP1704	04 54 06.45	-69 41 14.95	S013202225986	0.01		U0150-02249855	0.001	0		16.334	16.9	17.14		15.916		15.994	17.1
RP1844	04 54 08.72	-68 37 02.98	S013232298143	0.01		U0150-02250505	0.011	307		15.495	16.7	15.37		14.509		14.383	15.8
RP1757	04 54 11.97	-69 00 53.94	S013202241539	0.01		U0150-02251554	0.01	340		17.1	18.2	16.73		15.545		15.857	16.9
RP1814	04 54 12.32	-68 45 21.04	S0132011764	0.019		U0150-02251651	0.009	258		17.608	18.5	17.4		16.289		16.494	17.3
RP1700	04 54 23.92	-69 50 53.24	S013202219458	0		U0150-02255350	0.004	201		16.024	16.7	15.88		15.174		15.195	15.7
RP1767	04 54 26.05	-68 54 38.19	S0132030347	0.01		U0150-02255968	0.016	264		15.404	17.9	15.72		15.123		15.188	16.2
RP1765	04 54 30.18	-68 55 25.21	S013202242538	0.02						15.865		16.38		15.646		15.524	
RP1783	04 54 33.88	-69 20 35.71	S013202236648	0.01						15.796		15.69		14.385		14.049	
RP1766	04 54 37.11	-68 55 19.47	S013203021977	0.01		U0150-02259566	0.01	285		15.812	17.4	16.01		15.339		15.614	16.4
RP1784	04 54 53.95	-69 23 23.74	S013202235339	0.01		U0150-02264839	0.027	292		14.41	13.6	14.92		14.1		13.782	11.8
RP1651	04 54 54.76	-70 33 41.49	S01320233278	0.01		U0150-02265172	0.01	162		15.737	15.5	15.25		14.869		14.622	15.3
RP1781	04 55 27.18	-69 29 33.11	S013202232194	0.01						15.462		15.92		14.778		14.452	
RP1786	04 55 28.71	-69 21 36.59	S013202264015	0						14.67		14.35		13.235		13.315	
RP1780	04 55 33.97	-69 29 43.58	S013202256435	0.03						13.672		12.56		14.947		12.802	
RP1710	04 55 39.89	-69 34 09.04	S013202252830	0.02		U0150-02279100	0.026	265		15.627	16.3	14.99		14.025		13.992	15.5
RP1843	04 55 44.36	-68 35 42.93	S013201134836	0		U0150-02280605	0.023	90			13	14.69					11.9
RP1779	04 55 58.23	-69 28 18.38	S013202257565	0.01		U0150-02284713	0.013	299		15.009	15.4	14.89		13.763		13.628	15.1
RP1829	04 55 59.94	-68 42 08.83	S013201133373	0						17.821		17.16		15.86		16.264	
RP1703	04 56 01.98	-69 43 22.89	S013202247799	0.01		U0150-02285858	0.011	228		15.888	17.3	15.99		15.108		15.098	16.5
RP1733	04 56 14.22	-69 21 29.67	S013202264310	0.01		U0150-02289613	0.011	219		15.952	17.3	15.38		14.725		14.249	15.4
RP1857	04 56 14.37	-68 22 59.33	S013201139202	0		U0150-02289662	0.006	243		14.875	16.1	15.03		14.335		14.225	15.5
RP1828	04 56 23.14	-68 41 34.41	S013201133495	0		U0150-02292339	0.005	156		17.572	18.3	16.92		15.877		16.139	17.1
RP1782	04 56 23.42	-69 24 41.56	S013202262364	0.01								17.05					
RP1736	04 56 37.52	-69 16 08.52				U0150-02296654	0.016	253		15.313	16.3	15.74		15.067		14.923	15.9
RP1732	04 56 44.68	-69 20 53.46	S0132022107798	0.01						18.082		17.98		16.375		16.657	
RP1762	04 56 54.26	-68 55 54.62								19.57				16.919		15.567	
RP1928	04 57 26.91	-66 44 08.72	S013232081700	0		U0225-01456801	0.016	257		16.194	15.8	15.9		15.107		15.833	16.5
RP1746	04 57 48.54	-69 04 15.61	S013202273517	0.02		U0150-02320752	0.011	214		17.528	18.5	17.42		16.21		16.432	17.4
RP1884	04 58 07.26	-67 41 11.47				U0150-02328890	0.007	332		14.07	14.1	14.45		14.048		13.013	11.9
RP1737	04 58 17.48	-69 17 20.19	S013202268066	0.01		U0150-02333454	0.02	358		16.145	16.9	16.46		15.514		15.66	16.6
RP1806	04 58 33.31	-68 50 49.99	S0132030150	0.014						13.08		12.48		12.074		13.153	
RP1826	04 58 38.12	-68 42 26.59	S013203038487	0.01		U0150-02342480	0.008	220		16.565	17.3	16.1		15.338		15.506	16.8
RP1804	04 58 55.65	-68 51 45.19	S013203027984	0		U0150-02350049	0.011	134		15.378	16.4	14.89		14.171		14.157	15.1
RP1747	04 58 56.23	-69 03 29.10	S01320301436	0.01						17.598		16.16		14.113		14.539	
RP1839	04 58 56.52	-68 35 02.85	S013201135277	0		U0150-02350384	0.004	138		15.376	16.5	15.3		14.584		14.523	15.4
RP1860	04 58 58.47	-68 20 32.84	S013201140684	0						16.147		16.65		15.374		15.371	
RP1774	04 59 35.00	-70 06 59.07	S013202340960	0.02						13.697		14.34		12.906		13.11	
RP1775	04 59 37.18	-70 09 09.61	S013202339583	0.01		U0150-02367613	0.058	149		13.053	11.4	14.35		15.114		13.278	11.8
RP1717	04 59 44.89	-69 28 57.26	S013202257961	0.01		U0150-02370560	0.027	203		15.167	16.5	15.43		14.74		14.797	15.5
RP1724	04 59 44.90	-69 25 32.53	S013202261464	0		U0150-02370600	0.011	205		16.603	17.4	16.16		15.31		15.39	16.5
RP1656	04 59 46.62	-70 25 27.70	S013202330423	0		U0150-02371390	0.01	84		17.832	18.1	17.55		16.63		16.762	17.5
RP1698	04 59 48.42	-69 54 13.06	S013202244533	0.01						16.033		15.97		15.035		14.861	
RP1856	04 59 54.75	-68 23 07.43	S013201139631	0						15.211		15.42		14.665		14.567	
RP1777	05 00 13.12	-70 02 56.50															

RP Object	RA J2000	DEC J2000	GSC2.2 Catalog Reference	d mins GSC2.2	OGLE Catalog Reference	USNO Catalog Reference	d mins USNO	PA deg.	B Mag Ogle	B Mag SC	B Mag USNO	V Mag GSC2.2	V Mag OGLE	I Mag SC	I Mag OGLE	R Mag SC	R Mag USNO
RP <i>s</i> 1722	05 00 14.06	-69 25 13.98			SC15 5854	U0150-02382843	0.016	312	15.815		15.8		15.759		15.498	14.639	15.4
RP <i>s</i> 1855	05 00 28.46	-68 23 04.41	S013201139687	0		U0150-02388956	0.007	161		16.75	17.6	16.3		15.408		15.656	16.9
RP <i>s</i> 1755	05 00 28.77	-69 01 06.37	S013203017314	0.01	SC15 31595				16.637			16.44	16.589		16.363	14.215	
RP <i>s</i> 1729	05 00 35.39	-69 19 53.36	S013202266654	0.02	SC15 9370	U0150-02391673	0.027	307	15.377		16.8	14.71	15.409		15.236	14.067	14.6
RP <i>s</i> 1662	05 01 32.53	-70 16 56.11	S013202335246	0.01		U0150-02416226	0.001	0		16.796	17.7	16.35		15.38		15.583	16.8
RP <i>s</i> 1707	05 01 33.25	-69 36 58.72	S013202252033	0.01		U0150-02416553	0.005	302		16.037	17.6	15.65		15.094		15.049	15.9
RP <i>s</i> 1832	05 01 48.92	-68 37 33.62	S013203044129	0						15.183		14.85		14.393		14.385	
RP <i>s</i> 1663	05 01 50.52	-70 16 14.93								16.814		16.55		16.101		16.027	
RP <i>s</i> 1645	05 02 00.95	-70 42 23.74	S013202322779	0.01		U0150-02428478	0.015	339		14.256	12.9	14.95		14.816		13.233	13.5
RP <i>s</i> 1792	05 02 03.12	-69 03 40.94	S013203014882	0.02	SC15 197045				16.771			16.74	16.685		16.269	15.402	
RP <i>s</i> 1838	05 02 26.96	-68 36 55.82	S013203044797	0.01		U0150-02439738	0.006	25		14.136	14.8	13.69		13.266		13.554	13.4
RP <i>s</i> 1854	05 02 39.99	-68 27 59.41	S013203051299	0		U0150-02445341	0.023	35		14.235	12.5	14.84		14.465		13.481	13.1
RP <i>s</i> 1750	05 02 45.65	-69 03 13.12	S013203015506	0						17.593		16.64		15.786		15.763	
RP <i>s</i> 1745	05 02 50.69	-69 07 57.67			SC14 28777	U0150-02449700	0.035	328	16.292		16		16.373		16.489	13.695	14.5
RP <i>s</i> 1834	05 03 04.89	-68 38 35.68	S013203043414	0						16.98		16.86		15.848		15.967	
RP <i>s</i> 1850	05 03 26.01	-68 28 24.34	S013203051028	0						18.899				16.639		16.261	
RP <i>s</i> 1852	05 03 32.09	-68 27 56.18				U0150-02468002	0.006	282		17.13	16.9			16.611		16.456	17.1
RP <i>s</i> 1845	05 03 32.94	-68 32 35.00	S013203048338	0.01						15.288		16.1		15.325		15.154	
RP <i>s</i> 1794	05 03 38.63	-69 01 21.29	S013203017726	0.02	SC14 96680				15.926			14.92	15.929		15.71	14.782	
RP <i>s</i> 1793	05 03 38.94	-69 01 11.94	S013203017983	0.02	SC14 96683	U0150-02471264	0.031	27	15.139		15	15.3	15.308		15.45	14.998	14.1
RP <i>s</i> 1851	05 03 39.12	-68 28 23.75	S013203051077	0.01		U0150-02471310	0.007	79		15.466	14.5	15.74		15.218		15.062	15.9
RP <i>s</i> 1614	05 03 41.74	-71 07 09.71								19.35						18.733	
RP <i>s</i> 1760	05 03 51.47	-68 57 25.33	S013203022554	0.01	SC14 170011	U0150-02477203	0.016	85	13.867		15.6	13.54	14.001		13.942	13.47	13.7
RP <i>s</i> 1899	05 03 52.12	-67 32 43.67				U0150-02477437	0.004	101		17.813	17.6	17.75				16.431	17.8
RP <i>s</i> 1945	05 04 09.07	-67 18 30.14	S013201319463	0.01								14.63	14.852		14.75	14.561	
RP <i>s</i> 1910	05 04 17.16	-67 10 55.46	S013201325440	0.01						16.451		16.66		16.168		15.928	
RP <i>s</i> 1909	05 04 18.26	-67 10 30.36	S013201325741	0.02						14.245		16.13		15.145		15.158	
RP <i>s</i> 1944	05 04 24.06	-67 19 45.92	S013201318296	0.02		U0225-01559820	0.055	62			12.2		18.424		18.532		17.1
RP <i>s</i> 1738	05 04 31.78	-69 17 40.92	S01320303957	0						15.481		15.71		15.004		14.688	
RP <i>s</i> 1817	05 04 35.61	-68 44 55.12	S0132030108	0.01	SC14 252731	U0150-02498427	0.009	215	12.281		13.3	12.2	12.168		11.832		11.5
RP <i>s</i> 1881	05 04 37.15	-67 49 49.07	S013201121296	0		U0150-02499356	0.018	79		13.259	10.8	14.13		15.839		14.874	13.5
RP <i>s</i> 1751	05 04 37.41	-69 05 05.71	S013203013936	0.02	SC14 225625				16.008			15.77	16.176		16.316	15.289	
RP <i>s</i> 1923	05 04 40.40	-66 49 49.01	S01320108396	0		U0225-01563865	0.01	299		15.399	14.2	16.07		15.711		15.014	16.3
RP <i>s</i> 1672	05 04 40.78	-70 42 06.04								18.817				16.477		17.387	
RP <i>s</i> 1863	05 04 44.02	-68 16 32.41	S013201143367	0						15.735		15.74		15.017		14.897	
RP <i>s</i> 1795	05 04 44.85	-68 58 31.15	S013203021281	0	SC14 234471				13.891			13.65	13.871		13.636	13.426	
RP <i>s</i> 1936	05 04 47.97	-66 38 53.27	S013201014337	0		U0225-01565871	0.011	68		17.804	16.6	17.27		15.919		15.999	17.3
RP <i>s</i> 1935	05 04 51.70	-66 38 07.62	S013201015047	0								15.17					
RP <i>s</i> 1675	05 04 54.94	-70 43 33.73	S013202322514	0.02						13.073		14.04		12.836		12.874	
RP <i>s</i> 1650	05 04 56.74	-70 34 45.95	S013202326272	0.01						15.46		15.78		15		15.358	
RP <i>s</i> 1640	05 04 58.05	-70 41 03.03	S013202323504	0.02						14.928		14.35		13.102		13.147	
RP <i>s</i> 1901	05 04 58.48	-67 32 05.25	S013201345991	0.03						15.706		17.9		15.52		16.112	
RP <i>s</i> 1639	05 05 00.69	-70 41 03.41	S013202323456	0.02						15.94		16.23		15.524		14.855	
RP <i>s</i> 1818	05 05 04.09	-68 44 40.42	S013203037602	0	SC13 35171				16.298			16	16.194		15.766	15.069	
RP <i>s</i> 1820	05 05 22.28	-68 43 39.52	S013203038776	0.01	SC13 35194				16.667			15.7	16.553		16.228		
RP <i>s</i> 1629	05 05 25.31	-70 51 53.88								17.641				14.826		16.373	
RP <i>s</i> 1641	05 05 26.53	-70 39 45.27	S013202324083	0.01		U0150-02523108	0.02	319		15.844	17.1	15.69		15.678		15.205	15.9
RP <i>s</i> 1642	05 05 30.41	-70 40 22.05	S013202323773	0.01						17.008		16.59		15.604		15.731	
RP <i>s</i> 1926	05 05 33.48	-66 51 17.98	S01320107742	0		U0225-01577904	0.017	206		16.564	16	17.51		15.792		15.636	16.6
RP <i>s</i> 1821	05 05 39.09	-68 43 20.20	S013203039737	0.07	SC13 106982				14.977			14.41	15.02		14.982		
RP <i>s</i> 1861	05 05 56.94	-68 20 03.23	S013203055506	0.01								14.99					
RP <i>s</i> 1915	05 06 08.53	-67 01 23.16	S013201331482	0		U0225-01587235	0.01	220		16.001	16.2	15.69		15.563		15.351	16
RP <i>s</i> 1882	05 06 26.66	-67 42 58.32	S013201126372	0		U0150-02552100	0.01	337		15.762	14.9	14.98				17.563	17.8
RP <i>s</i> 1822	05 06 38.01	-68 44 41.58	S013203037812	0.01		U0150-02557868	0.009	64		18.002		17.5		16.338		16.017	15.6
RP <i>s</i> 1754	05 06 39.31	-69 01 22.52	S013203018107	0.01						18.763						17.529	
RP <i>s</i> 1879	05 06 50.97	-67 46 53.76								20.146	19.9					17.563	17.8
RP <i>s</i> 1865	05 06 54.00	-68 16 08.94				U0150-02566013	0.019	220								14.627	15.6
RP <i>s</i> 1847	05 06 59.17	-68 31 56.55	S013203049161	0		U0150-02568818	0.009	125			14.9	14.89		14.592		16.051	17.1
RP <i>s</i> 1811	05 07 01.08	-68 46 60.08	S013203035408	0		U0150-02569744	0.014	228		17.901	19.5	16.61					

RP Object	RA J2000	DEC J2000	GSC2.2 Catalog Reference	d mins GSC2.2	OGLE Catalog Reference	USNO Catalog Reference	d mins USNO	PA deg.	B Mag Ogle	B Mag SC	B Mag USNO	V Mag GSC2.2	V Mag OGLE	I Mag SC	I Mag OGLE	R Mag SC	R Mag USNO
RP _s 1837	05 07 11.00	-68 36 31.84	S013203045734	0		U0150-02574919	0.007	118		16.031	17.9	15.46		14.917		14.893	15.9
RP _s 1744	05 07 11.44	-69 10 50.04	S01320308726	0.01						14.615		15.42			15.346	15.08	
RP _s 1914	05 07 11.54	-67 02 23.09	S013201330984	0.01		U0225-01605095	0.005	106		14.877	14.6	14.92		14.784		14.502	15.4
RP _s 1836	05 07 16.78	-68 39 06.64	S013203043527	0						16.763		15.6		15.039		14.954	
RP _s 1262	05 07 26.42	-69 59 41.56	S013202345622	0.02	SC12 163287	U0150-02582713	0.004	262	15.55		16.3	15.25	15.527		15.346	14.376	15
RP _s 1302	05 07 41.85	-69 22 30.31	S01320302287	0.02	SC11 21389				14.886			15.04	14.934		14.814	14.939	
RP _s 1132	05 07 44.47	-71 23 53.67	S010101332560	0		U0150-02592415	0.007	131		16.502	16.5	16.34		15.533		15.748	16.1
RP _s 1862	05 07 47.09	-68 18 59.60	S013203055955	0.01		U0150-02593797	0.017	46			16.5	16.55					16.7
RP _s 1136	05 08 01.19	-71 21 25.87	S010101333852	0		U0150-02600716	0.008	83		15.56	15.6	15.36		14.825		14.988	15.4
RP _s 1171	05 08 07.04	-70 55 15.97	S0132021400	0.01		U0150-02603530	0.006	57		15.896	15.9	15.67		15.043		14.918	15.9
RP _s 1322	05 08 12.63	-68 58 15.08	S013203022170	0.05	SC11 145977				16.387			15.97	16.286		15.987		
RP _s 1459	05 08 13.68	-68 36 12.82								14.516				15.943		16.13	
RP _s 1501	05 08 29.55	-68 21 09.23	S013203055110	0		U0150-02613620	0.022	93		16.501	17.5	16.57		15.342		15.609	16.2
RP _s 1206	05 08 29.91	-70 20 42.62	S013202112913	0.01		U0150-02613698	0.008	36		15.341	15.9	15.47		14.811		14.601	15.7
RP _s 1473	05 08 32.37	-68 28 51.71				U0150-02614748	0.016	1		16.779	17.3	17.04		15.823		15.955	17.1
RP _s 1393	05 08 33.49	-69 04 48.63			SC11 135957				17.737				17.732		17.623		
RP _s 1151	05 08 36.12	-71 11 28.13	S010101238204	0.01						18.552		17.9				17.561	
RP _s 1299	05 08 38.80	-69 25 34.16	S01320301794	0.01	SC11 103743				15.482			15.78	15.592		15.681	16.127	
RP _s 1298	05 08 41.11	-69 24 44.97				U0150-02618204	0.073	276		19.725	21.1			16.197		17.75	17.8
RP _s 1483	05 08 52.73	-68 26 29.41	S013203052475	0.05		U0150-02623498	0.035	266		18.32	18.3	16.73		15.213		15.464	16.3
RP _s 1472	05 09 01.39	-68 32 12.55	S013203049034	0.01		U0150-02627193	0.029	238		15.819	15.9	14.72		15.395		15.231	15.3
RP _s 1133	05 09 06.46	-71 21 10.97	S01010133400	0		U0150-02629404	0.013	246		16.024	16.3	16.29		15.566		15.795	15.9
RP _s 1145	05 09 29.88	-71 15 23.17	S010101336440	0		U0150-02639307	0.007	265		14.659	14.4	14.71		14.399		14.361	14.5
RP _s 1126	05 09 41.93	-71 27 41.54	S010101330832	0		U0150-02644165	0.08	266		13.319	11.1	14.8		14.779		14.225	11.7
RP _s 1531	05 09 44.24	-67 57 50.52	S013201113250	0.01		U0150-02645526	0.011	273		15.495	16.4	15.4		14.887		14.679	15.4
RP _s 1326	05 09 47.58	-69 00 31.59	S013203019488	0.02	SC11 320107				15.696	16.889		15.96	15.86		16.016	15.595	
RP _s 1311	05 09 58.94	-69 10 39.65	S01320309053	0.01	SC11 300974				15.548			15.5	15.63		15.711		
RP _s 1134	05 10 08.37	-71 20 35.51	removed							20.45		15.36				18.401	
RP _s 1471	05 10 12.42	-68 32 31.14	S013203048876	0.05		U0150-02658721	0.012	40		17.128	17.8	17.07		16.35		17.174	17.7
RP _s 1312	05 11 03.97	-69 07 32.65	S01320337993	0.01	SC10 109818				16.337			15.98	16.029		15.334	15.734	
RP _s 1419	05 11 56.00	-68 53 18.67			SC10 275054				19.15				18.657		17.889		
RP _s 1290	05 12 07.66	-69 28 35.07			SC10 225872				16.347				16.34		16.081	15.516	
RP _s 1209	05 12 08.38	-70 28 40.36	S01320218129	0.04		U0150-02712096	0.042	283		13.905	14.1			15.163		13.164	13.5
RP _s 1158	05 12 09.11	-71 06 49.92	S01010124742	0.01		U0150-02712630	0.001	33		14.981	14.9	14.18		13.841		14.003	14.4
RP _s 1316	05 12 20.07	-69 04 49.51	S01320339785	0.01	SC10 260043	U0150-02717762	0.008	24	16.386		18.6	16.06	16.313		16.041	15.518	16
RP _s 1422	05 12 22.83	-68 52 38.19	S013203319485	0	SC10 274142				14.644			14.51	14.534		13.918	14.703	
RP _s 1211	05 12 32.12	-70 29 03.30	S01320217919	0.02		U0150-02723407	0.017	349		15.675	16.7	15.83		15.184		14.9	15
RP _s 1205	05 12 36.18	-70 24 58.65	S013202110184	0.01		U0150-02725347	0.004	193		16.497	17.2	16.66		15.937		15.961	16.9
RP _s 1597	05 12 36.69	-66 38 22.51	S013201340035	0		U0225-01698237	0.014	201		15.279	14.9	14.87		14.516		14.253	15.2
RP _s 1392	05 12 47.90	-69 03 06.42	S013203310954	0.01	SC9 65324				15.875			15.08	15.657		15.079	14.655	
RP _s 1461	05 12 49.60	-68 33 55.66	S013203336221	0.01		U0150-02731588	0.007	74		17.634	17.1	17.46		15.843		16.406	17.2
RP _s 1389	05 13 17.44	-69 19 55.02	S013203146573	0.01	SC9 127600	U0150-02744501	0.023	318	15.891	15.95	17.2	15.9	16.032		16.154	14.659	14.5
RP _s 1348	05 14 13.05	-69 33 24.67	S013203123689	0.01	SC9 198321				14.14			13.93	14.232		14.178	14.262	
RP _s 1350	05 14 14.90	-69 36 08.78	S013203119056	0.05	SC9 193733				17.369				16.977		16.378	15.813	
RP _s 1499	05 14 29.85	-68 20 50.90	S013203346200	0.02						17.988		15.17				16.226	
RP _s 1470	05 14 32.47	-68 32 46.92	S013203360939	0.09		U0150-02778970	0.049	134			12.9	17.98					16.1
RP _s 1574	05 14 43.41	-67 12 25.30	S013201257215	0.01						14.451		15.12		15.22		14.239	
RP _s 1563	05 15 09.95	-67 32 15.37	S013201282937	0.01		U0150-02796061	0.004	51		16.459	16.1			15.99		15.867	17.3
RP _s 1260	05 15 10.00	-70 01 21.60	S013202132262	0.01		U0150-02796107	0.015	151		18.569	19.4	17.82		16.525		16.877	17.6
RP _s 1524	05 15 41.41	-67 58 52.40	S013203269318	0.01		U0150-02809040	0.009	320		13.685	12.3	14.62		14.311		12.963	11.7
RP _s 1582	05 15 45.61	-66 58 42.37								19.508						18.534	
RP _s 1469	05 15 48.74	-68 33 04.01	S013203336767	0.3		U0150-02811982	0.008	239		17.038	18.3	17.43		16.025		16.39	17.2
RP _s 1414	05 16 24.57	-68 55 27.64	S013203316735	0.01	SC8 264446				16.914			16.98	16.905		16.895		
RP _s 1335	05 16 27.14	-69 26 22.60	S013203135789	0.07	SC8 212582				17.5			15.92	17.372		16.95		
RP _s 1529	05 16 31.96	-67 56 50.21	S013203270696	0.01						15.188		15.6		15.148		15.083	
RP _s 1334	05 16 33.24	-69 31 29.28	S013203126607	0.08	SC8 205674				18.499			16.1	18.293		17.742		
RP _s 1423	05 16 39.06	-68 53 20.56	S013203357211	0.01	SC8 268942	U0150-02832201	0.002	74	17.842		20	17.96	17.689		17.657		17.7
RP _s 1386	05 16 39.11	-69 20 47.90	S013203144919	0.02	SC8 225386				17.131			16.71	17.21		17.019		
RP _s 1382	05 16 52.29	-69 33 56.40	S013203122593	0.03	SC8 198896				15.499			15.05	15.512		15.439		

RP Object	RA J2000	DEC J2000	GSC2.2 Catalog Reference	d mins GSC2.2	OGLE Catalog Reference	USNO Catalog Reference	d mins USNO	PA deg.	B Mag Ogle	B Mag SC	B Mag USNO	V Mag GSC2.2	V Mag OGLE	I Mag SC	I Mag OGLE	R Mag SC	R Mag USNO
RP s1381	05 17 01.02	-69 34 10.57	S013203121696	0	SC8 291817	U0150-02842280	0.012	69	15.57		20	15.21	15.64		15.574		15.9
RP s1525	05 17 06.93	-68 00 27.87	S013203267977	0		U0150-02844993	0.009	130		16.88	17	17.68		16.546		16.591	17.2
RP s1526	05 17 07.33	-68 00 18.54	S013203268101	0.01		U0150-02845215	0.013	59		16.376	16.8	16.5		15.502		15.686	16.3
RP s1331	05 17 08.13	-69 07 02.17	S013203161741	0.01	SC8 343463				17.164			17.16	17.021		16.886		
RP s2054	05 17 08.93	-69 32 21.18	S013203124892	0								13.19					
RP s1588	05 17 31.40	-66 43 30.17	S013201275581	0								15.27					
RP s1537	05 17 34.45	-67 50 08.79	S013203275596	0.01		U0150-02857306	0.005	84		14.043	14	14.53				14.221	14.1
RP s1538	05 17 35.37	-67 46 40.31	S013203278001	0		U0150-02857700	0.003	34		16.17	16.2	16.08		15.17		15.426	16.1
RP s1592	05 17 40.69	-66 42 08.87	S013201276255	0.02								12.72					
RP s1591	05 17 40.80	-66 42 04.80								11.293						11.072	
RP s1593	05 17 40.96	-66 42 08.74												13.375			
RP s1478	05 17 46.26	-68 30 03.20	S013203339118	0		U0150-02862624	0.006	148		16.779	16.9	16.61		15.52		15.842	16.5
RP s1374	05 17 53.26	-69 11 44.15	S013203156585	0	SC7 86307	U0150-02865761	0.013	113	14.3		20.1	14.46	14.405		14.36	15.413	16.1
RP s1373	05 17 57.65	-69 11 10.32	S013203157288	0.01	SC7 86310	U0150-02867663	0.024	79	14.137		20.2	14.11	14.159		13.942		15.6
RP s1384	05 17 59.80	-69 30 07.65	S013203128623	0	SC7 47341				15.566			14.9	15.297		14.722	15.515	
RP s1383	05 18 02.98	-69 29 49.10	S013203129049	0.01	SC7 47422	U0150-02869905	0.077	13	17.346		25.7	17.22	16.881		16.034	16.048	17.3
RP s1448	05 18 08.15	-68 42 39.95	S013203327977	0		U0150-02872068	0.013	86		15.329	15.2	16.04		15.391		15.075	15.5
RP s1503	05 18 59.76	-68 14 39.44	S013203349201	0		U0150-02894246	0.011	39		16.745	17.1	16.91		15.827		16.06	16.9
RP s1514	05 19 07.79	-68 05 42.02	S0132032100278	0.01		U0150-02897667	0.013	95		13.989	13.9	14.22		13.392		13.572	13.4
RP s1517	05 19 07.91	-68 02 57.76	S013203266058	0		U0150-02897663	0.007	10		17.672	18.1	17.77		16.734		16.815	17.4
RP s1468	05 19 08.33	-68 34 01.54	S013203335485	0.02						17.659		17.44		16.845		16.625	
RP s1339	05 19 11.45	-69 41 55.90	S013203110644	0.01	SC7 255063				16.681			16.6	16.688		16.487	17.04	
RP s1437	05 19 12.83	-68 44 04.63	S013203326554	0.04		U0150-02899625	0.036	217		17.287	17.7	17.44		15.788		16.811	16.1
RP s1506	05 19 17.99	-68 13 45.02	S013203349570	0.01		U0150-02901912	0.006	312		15.803	16.1	15.8		15.278		15.354	16
RP s1479	05 19 25.11	-68 29 36.74	S013203339293	0.01						15.084		15.27		14.53		14.222	
RP s1149	05 19 29.28	-71 15 50.72	S01010121311	0.01		U0150-02906586	0.017	191		15.608	15.5	15.45		14.798		15.12	15.3
RP s1436	05 19 33.68	-68 45 24.53	S013203358719	0.01		U0150-02908458	0.003	76		18.211	18.8	17.97		16.678		17.084	17.7
RP s1370	05 19 34.20	-69 57 50.60	S013202136684	0.01						16.123		15.25		15.684		15.404	
RP s1539	05 19 37.30	-67 49 30.51	S0132032122868	0		U0150-02910003	0.008	68		15.412	14.9	15.04		14.692		14.334	15.1
RP s1340	05 19 44.00	-69 40 28.35	S013203112354	0	SC7 380031	U0150-02912749	0.008	132	15.72		21.2	15.79	15.791		15.821	16.14	16.7
RP s1449	05 20 11.54	-68 37 53.71	S013203331963	0		U0150-02924445	0.007	51		16.308	17.6	17.73		15.935		15.859	17
RP s1452	05 20 12.96	-68 38 08.34	S013203331770	0.03		U0150-02925160	0.027	87		14.195	14	14.7		14.619		13.99	15.5
RP s1342	05 20 15.34	-69 40 28.99	S013203112114	0.01	SC6 48573	U0150-02926079	0.02	172	15.291		20.5	15.19	15.468		15.696	15.998	16.5
RP s1600	05 20 17.83	-66 52 53.59				U0225-01843046	0.045	270		12.385	10.6			14.196		12.883	12.2
RP s1265	05 20 34.34	-70 00 33.07	S013202132471	0.01	SC6 5808				17.489			17.04	17.273		16.756	16.53	
RP s1356	05 20 39.89	-69 44 59.15	S01320317243	0.01	SC6 155977	U0150-02937513	0.041	119	15.096		20.7	15.06	15.075		14.892	15.967	15.5
RP s1586	05 20 40.11	-66 48 49.19	S0132012107706	0.01						14.225		15.5		14.697		14.98	
RP s1355	05 20 45.17	-69 58 24.55	S013202164516	0.01	SC6 131604				19.95			17.83	19.224		18.385		
RP s1343	05 20 47.86	-69 39 56.26	S013203112973	0.01	SC6 170496	U0150-02940959	0.01	67	16.815		20.8	15.74	16.672		16.227		16.5
RP s1238	05 20 49.08	-70 12 40.84	S013202118344	0.02	SC21 85424				16.875				16.664		16.295	15.851	
RP s1344	05 20 51.12	-69 38 28.95	S013203114418	0	SC6 170538				15.637			15.55	15.628		15.378	16.01	
RP s1173	05 20 54.35	-70 49 42.11	S010101215216	0	SC21 57039	U0150-02943793	0.011	137	15.166		16.1		15.093		14.853	15.645	15.7
RP s1535	05 20 57.37	-67 49 21.14	S0132032122838	0.01		U0150-02945105	0.01	81		18.94	12.6	14.77				18.19	13.1
RP s1368	05 21 05.22	-69 01 03.36	S013203166749	0.01								17.58				16.224	
RP s1156	05 21 15.37	-71 05 29.79								18.041						18.145	
RP s1515	05 21 15.85	-68 01 59.79	S013203266326	0		U0150-02953157	0.009	38		14.641	15.4	14.56		14.349		13.874	14.4
RP s1551	05 21 16.35	-67 57 01.68	S0132032276	0.02		U0150-02953460	0.028	60		14.739	14.7	14.71		14.231		13.72	13.7
RP s1365	05 21 16.97	-69 04 57.86	S013203163113	0.01		U0150-02953636	0.01	12		17.135	16.5	16.22		15.632		15.992	16.4
RP s1360	05 21 17.30	-69 19 53.92	S013203145276	0.03	SC6 214298	U0150-02953582	0.04	294	14.923		18.5	14.53	14.97		14.817	15.089	13.5
RP s1542	05 21 20.43	-67 47 06.80	S0132032136264	0		U0150-02955143	0.003	3		16.716	16.4	16.92		16.007		15.989	16.4
RP s1266	05 21 21.48	-69 59 00.25	S013203132018	0.01	SC6 249718				20.585			15.88	19.856		18.229		
RP s1362	05 21 29.45	-69 07 25.43				U0150-02959152	0.014	97		18.631	20.2			16.513		17.747	17.8
RP s1494	05 21 31.88	-68 20 59.57	S013203345472	0.02		U0150-02960101	0.017	348		14.859	15	14.84		14.424		14.043	14.9
RP s1367	05 21 36.06	-69 02 30.74	S013203165372	0.01		U0150-02962041	0.015	82		15.584	17.5	15.04		15.201		15.235	14.6
RP s1481	05 21 36.52	-68 28 55.79	S013203339471	0.01		U0150-02962176	0.008	14		15.867	16.1	15.69		15.112		15.006	15.9
RP s1543	05 21 38.09	-67 46 52.11	S0132032136292	0.01		U0150-02962911	0.011	48			12.6	16.22					12.9
RP s1480	05 21 38.47	-68 28 21.11	S013203339932	0						17.85		17.84		16.704		16.932	
RP s1359	05 21 40.54	-69 26 06.11	S013203134543	0.01	SC6 322365	U0150-02963896	0.015	212	16.448		20.4	15.42	16.555		16.315	16.237	15.6
RP s715	05 21 47.25	-69 52 33.50	S013202142948	0.01	SC6 260753	U0150-02966957	0.019	53	17.018		20.9	16.68	16.605		15.867	16.721	17.1

RP Object	RA J2000	DEC J2000	GSC2.2 Catalog Reference	d mins GSC2.2	OGLE Catalog Reference	USNO Catalog Reference	d mins USNO	PA deg.	B Mag Ogle	B Mag SC	B Mag USNO	V Mag GSC2.2	V Mag OGLE	I Mag SC	I Mag OGLE	R Mag SC	R Mag USNO
RP s2173	05 21 54.96	-69 46 35.99	S01320315582	0.03	SC6 273912	U0150-02970166	0.012	355	15.671		20.8	15.42	15.576		15.263	16.07	16.7
RP s852	05 22 02.11	-69 02 05.82	S013203165603	0.01						17.39				16.937		15.911	
RP s2174	05 22 02.73	-69 46 14.48	S01320315848	0		U0150-02973617	0.007	31		19.393	20.6	15.17		15.57		15.788	16.5
RP s985	05 22 03.16	-67 47 04.28	S0132032136219	0.02		U0150-02973891	0.032	45		17.785	11.1	17.08				16.28	11.5
RP s606	05 22 07.95	-70 17 01.10	S010101233265	0.02		U0150-02975873	0.011	16		16.942	18.8	15.63		15.094		15.404	16.3
RP s718	05 22 10.51	-69 49 43.17	S01320313308	0.05	SC6 384268	U0150-02977015	0.05	155	16.712		21.1	15.44	16.787		16.781	15.99	16.2
RP s1059	05 22 10.82	-67 34 50.59	S0132032138256	0						14.933		16.19		15.427		14.953	
RP s813	05 22 14.14	-69 19 30.62	S013203145154	0	SC6 448194				16.836			16.42	16.876		16.702	16.36	
RP s854	05 22 17.44	-69 03 04.86	S013203164675	0.04		U0150-02979844	0.018	214		16.478	19.1	15.71		14.917		15.315	15.4
RP s716	05 22 17.90	-69 50 49.09	S01320312663	0.01	SC6 384140	U0150-02979990	0.02	272	15.842		19.4	16.02	15.786		15.491	15.878	16.2
RP s925	05 22 22.88	-68 41 00.85	S013203328716	0.01		U0150-02982252	0.026	17		16.497	17.4	17.47		15.585		15.692	15.9
RP s853	05 22 28.54	-69 00 43.20	S013203166806	0.01		U0150-02984565	0.009	21		15.213	16.2	14.71		14.562		14.364	14.8
RP s600	05 22 30.03	-70 23 53.60	S010101230117	0.02	SC21 171353	U0150-02985154	0.011	322	14.416		15.3	14.27	14.361		14.228	14.365	14.5
RP s978	05 22 39.72	-67 55 24.75	S013203270557	0.01		U0150-02989134	0.004	141		16.289	14.8	16.64		15.767		15.478	16.4
RP s948	05 22 48.19	-68 32 41.73	S013203335987	0.03						14.48		15.17		14.925		14.427	
RP s924	05 22 54.11	-68 41 42.73	S013203327953	0.04						15.527		15.93		15.461		15.119	
RP s871	05 22 54.20	-69 40 09.63	S013203180941	0.01	SC5 58478				17.329			17.33	17.312		17.111	17.363	
RP s901	05 22 58.45	-68 45 34.58	S013203175078	0.08		U0150-02996851	0.057	274		17.336	18.3	17.13		16.501		16.405	17.1
RP s752	05 22 58.47	-69 44 01.53			SC5 51095				19.39				18.946		18.212		
RP s984	05 22 59.58	-68 04 07.97	S0132032119529	0.01								14.32					
RP s962	05 23 00.14	-68 11 21.29	S013203298277	0		U0150-02997846	0.006	347		16.529	15.8	16.23		15.154		15.366	15.5
RP s814	05 23 05.25	-69 16 12.10	S013203149822	0.01	SC5 112858				15.134			14.66	15.16		14.947	14.837	
RP s1054	05 23 07.93	-67 38 14.11	S0132032125862	0.01		U0150-03001218	0.008	347		15.926	16.4	16.34		15.458		15.683	16.2
RP s420	05 23 12.37	-70 47 51.08								18.807						17.967	
RP s761	05 23 17.39	-69 40 53.51	S013203110893	0.01	SC5 177908	U0150-03005238	0.003	208	16.408		20.8	16.18	16.555	17.008	16.664	16.911	16.7
RP s870	05 23 17.43	-69 38 50.42	S013203113442	0.01	SC5 177730				16.955			15.49	16.248		14.044	16.573	
RP s982	05 23 17.73	-67 59 38.97	S0132032119870	0.01								17.39					
RP s922	05 23 21.91	-68 39 53.94	S013203329551	0.01						13.748		14.99		14.747		14.101	
RP s762	05 23 22.81	-69 41 15.32	S013203110589	0.01	SC5 169541				15.108			15.06	15.329		15.526	15.621	
RP s1010	05 23 24.32	-70 39 08.00	S010101241139	0						14.545		15.88		13.732		13.654	
RP s552	05 23 26.98	-70 41 26.91	S010101220158	0.02		U0150-03009243	0.012	258		15.439	16.1	15.26		15.049		14.899	15.6
RP s1094	05 23 30.46	-66 41 53.46	S013201242884	0.01		U0225-01908742	0.007	177		15.9	15.6	15.87		15.389		15.256	16.3
RP s983	05 23 31.90	-68 01 00.92	S013203266543	0.01						13.775		14.9		15.251		13.948	
RP s1062	05 23 33.30	-67 24 10.22	S0132032139806	0.01		U0225-01909733	0.039	181		12.985	10.8	14.88		14.225		12.464	14.6
RP s961	05 23 40.48	-68 05 28.85	S013203299979	0		U0150-03015069	0.011	33		15.81	15.8	15.8		15.146		14.879	15.5
RP s966	05 23 47.74	-67 56 32.42	S0132032120443	0.01		U0150-03018199	0.013	101		16.391	16.1	16.9		15.976		15.856	16.3
RP s964	05 23 49.64	-67 57 26.35	S0132032120266	0.01						16.034		17		15.751		15.505	
RP s899	05 24 03.12	-68 56 21.41	S013203169747	0.01		U0150-03025393	0.072	107		15.192	16.3	15.48		14.915		14.246	12.9
RP s928	05 24 06.36	-68 41 59.26	S013203176069	0.01						14.769		14.57		14.047		14.118	
RP s898	05 24 09.71	-68 57 04.01	S013203169181	0		U0150-03027958	0.009	159		17.055	18.1	16.89		16.276		16.21	17
RP s804	05 24 11.91	-69 21 17.80	S013203141719	0.08	SC5 328219				18.16			17.65	18.092		17.878	17.055	
RP s1061	05 24 12.33	-67 26 37.74	S013203243584	0.02						13.92		16.56		15.324		13.017	
RP s1060	05 24 12.47	-67 26 32.58	S0132032129072	0						13.92		16.43		15.324		13.017	
RP s847	05 24 12.49	-69 13 20.54	S013203153262	0						16.205		15.22		15.189		15.393	
RP s778	05 24 14.14	-69 27 40.38	S013203130687	0.01	SC5 315475				14.272			13.52	14.391		14.477	14.499	
RP s601	05 24 17.73	-71 31 50.28	S010103090792	0.01		U0150-03031463	0.001	0		15.601	13	13.27		13.156		12.722	11.7
RP s873	05 24 23.07	-69 39 08.90	S013203112703	0.01	SC5 292195				16.487			15.29	16.595		16.501	15.918	
RP s874	05 24 23.70	-69 38 53.60	S013203113188	0.02	SC5 292390	U0150-03033969	0.02	297	17.109		20.8	15.64	17.055		16.847	17.123	16.4
RP s1073	05 24 27.98	-67 09 10.43	S013201298143	0		U0225-01928397	0.005	216		13.143	11.9	14.74		14.337		14.453	11.7
RP s817	05 24 37.95	-69 15 36.79			SC5 456570	U0150-03040201	0.019	195	19.802		20.7		19.411		18.786	18.285	17.8
RP s1055	05 24 46.26	-67 38 11.12	S0132032137588	0		U0150-03043726	0.01	8		14.924	15	14.59		14.143		13.89	14.6
RP s1109	05 24 57.81	-67 24 58.21	S0132032139573	0		U0225-01938335	0.025	63		14.707	14.1	14.62		13.31		13.156	16.3
RP s2147	05 24 58.51	-69 03 04.55	S013203164014	0						16.343		15.63		15.213		15.299	
RP s944	05 25 00.39	-68 19 30.46	S013203345810	0.01		U0150-03049480	0.013	315		13.716	12.2	15.16		14.425		13.117	12.4
RP s567	05 25 01.95	-70 37 09.52	S010101222557	0.02		U0150-03050235	0.026	46		15.061	17.4	14.4		13.992		14.499	14.5
RP s2155	05 25 05.75	-69 06 56.48	S013203160353	0.01						16.826		16		13.919		14.538	
RP s943	05 25 10.22	-68 25 16.41	S013203341727	0		U0150-03053584	0.015	38		15.052	14.8	15.42		14.859		14.146	14.9
RP s800	05 25 10.89	-69 20 37.12	S013203142276	0.01	SC4 119963							16.23			16.189	15.376	
RP s707	05 25 12.29	-69 55 26.91	S0132031767	0	SC4 36261				15.32			15.81	15.431		15.373	16.742	

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